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# CATALOGUE

OF

# FOSSIL REPTILIA

AND

# AMPHIBIA.

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## PART III.

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# CATALOGUE

OF THE

# FOSSIL REPTILIA

AND

# AMPHIBIA

IN THE

# BRITISH MUSEUM

(NATURAL HISTORY),

CROMWELL ROAD, S.W.

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## PART III.

CONTAINING

THE ORDER CHELONIA.

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BY

RICHARD LYDEKKER, B.A., F.G.S., ETC.

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# PREFACE.

The Collection which forms the subject of this Catalogue is particularly rich in Chelonians from the Purbeck beds of Swanage, the Cretaceous of England and Holland, the Eocene Tertiaries of Harwich, Sheppey, Hampshire, the Isle of Wight, and the older Pliocene of the Siwaliks of India; the last-named beds have also yielded the largest tortoise known (the *Testudo* [*Colossochelys*] *atlas* of Falconer).

The last-surviving species of Chelonian indigenous to England was the *Emys orbicularis*, Linn., whose remains have been found in fluviatile (Post-Pliocene) deposits in Norfolk (see Geol. Mag. 1879, dec. ii. vol. vi. pl. viii. p. 304). Chelonians were well represented here in Tertiary and Cretaceous times; some of the largest forms (as *Chelone hoffmanni* and *Eosphargis gigas*) occurring in the Chalk and London Clay.

Of the fifty-two genera and one hundred and thirty-one species, or varieties, of fossil Chelonians recorded by Mr. Lydekker, only eighteen genera and ten species can be with certainty correlated with living forms.

The number of extinct species is no doubt in some cases too large, owing to the difficulties which surround the task of attempting decisively to determine the fragmentary and frequently headless remains of Chelonia met with in a fossil state.

In many instances,—as for example in that of the remarkable genus *Miolania*, from the Tertiaries of Australia and Lord Howe Island, of *Psephoderma* from the Trias, of *Pelobatochelys* from the Kimeridge Clay, and other extinct forms—it has been found impossible to place them with any existing families, and special families have been constituted for the reception of these and allied types.

Mr. Lydekker has endeavoured to correlate as far as possible the fossil with the existing forms, and to follow the same classification as that adopted in Mr. Boulenger's admirable Catalogue of the Recent Chelonia, from which many of the woodcuts have been kindly lent by Dr. Günther, Keeper of the Department of Zoology, to illustrate the present work.

HENRY WOODWARD.

Department of Geology,
Nov. 15, 1889.

# INTRODUCTION.

The present Part, which comprises only the order Chelonia, needs but little in the way of introduction.

The author must, however, express his indebtedness to Mr. Boulenger's Catalogue of recent Chelonians [1], without the aid of which it would have been quite impossible to have attained even such an approximation to a satisfactory arrangement of the fossil forms as is exhibited in the following pages [2]. To bring the classification of the fossil species into accordance with that adopted by Mr. Boulenger for the existing Chelonians, it has been found necessary to use generic terms in a much more restricted sense than is the case in the previous Part, where, having only extinct types to deal with, there was no obligation to follow any such model.

It should be observed in regard to the division of the Chelonia into two suborders that the author has, as a provisional measure, followed Messrs. Cope and Boulenger, who regard the Athecata as generalized types widely separated from all the other members of the order. Dr. Baur, however, considers that they are a specialized branch so closely connected with the *Chelonidæ* through the *Protostegidæ* that there is no justification for their subordinal separation. If the skull referred by this writer to *Protostega* be rightly assigned, there will be evidence of a closer connection between the two groups than has hitherto been supposed. If it could be absolutely proved that *Psephoderma* is not really Chelonian, one objection to Dr. Baur's views would be removed. In the event of this view proving to be

[1] Catalogue of the Chelonians, Rhynchocephalians, and Crocodiles in the British Museum (Natural History), by G. A. Boulenger (1889).

[2] The author also desires to express his obligations to Mr. Boulenger for much advice during the progress of this Catalogue.

the true one, the position of the Athecata (if retained as a suborder) should be at the opposite end of the series to that which it now occupies. The absence of any limb-bones of Chelonia in the Lettenkohle, where *Psephoderma* is common, is in favour of the contention that the specimens so described are not Chelonian.

Thanks are again due to Mr. William Davies, for kindly checking the entries of the individual specimens, and for information in regard to their history.

The *Bell Collection*, mentioned for the first time in this Part, comprises specimens from the London Clay collected by the late Professor Thomas Bell, and purchased in 1863.

The *Brown Collection*, made by the late Mr. John Brown, of Stanway, Essex, was in part presented by the owner, and in part by Sir R. Owen, K.C.B., in 1860.

The *Sloane Collection*, also first alluded to in the present Part, was purchased about the year 1754 from the executors of Sir Hans Sloane, of Chelsea.

The *Willcox Collection* was purchased in 1853 from Mr. C. Willcox of Swanage.

RICHARD LYDEKKER.

Harpenden,
November, 1889.

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[Existing species are denoted by an asterisk; and doubtful species by two asterisks.]


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# ABBREVIATIONS OF SERIALS QUOTED IN THIS VOLUME

AND NOT MENTIONED IN THE LISTS GIVEN IN PARTS I. & II.

[Where not otherwise stated, the works are in 8vo.]

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*Act. Soc. Linn. Bordeaux.*—Actes de la Société Linnéenne de Bordeaux. *Bordeaux.*

*Ann. Soc. Géol. Nord.*—Annales de la Société Géologique du Nord. *Lille.*

*Ann. Mus. Wien.*—Annalen des Wiener Museums der Naturgeschichte. 4to. *Vienna.*

*Arch. f. Naturgeschichte.*—Archiv für Naturgeschichte. *Berlin.*

*Bull. Soc. Philom.*—Bulletin de la Société Philomatique de Paris. *Paris.*

*Extr. Procès-Verb. Soc. Agric. Lyon.*—Extraits des Procès-Verbaux, publiées par la Société royale de Agriculture, etc. de Lyon.—*Lyons.*

*Journ. Bombay As. Soc.*—Journal of the Bombay Branch of the Royal Asiatic Society. *Bombay.*

*Mem. Geol. Surv. Ind.*—Memoirs of the Geological Survey of India. *Calcutta.*

*Monatsb. k. preuss. Ak. Wiss.*—Monatsbericht der königlich preussischen Akademie der Wissenschaften zu Berlin. *Berlin.*

*N. Denkschr. schw. Ges. Nat.*—Neue Denkschriften der Allgemeinen schweizerischen Gesellschaft für Naturwissenschaften. 4to *Zurich.*

*Science.*—Science. 4to. *Cambridge, Mass.*

*Sitz. k. Ak. Wien.*—Sitzungsberichte der math.-nat. Classe der k. Akademie der Wissenschaften.—*Vienna.*

*Trans. Linn. Soc.*—Transactions of the Linnean Society. 4to. *London.*

*Zool. Journ.*—Zoological Journal. *London.*

# CORRIGENDA AND ADDENDA TO PARTS I. & II.

Part I., p. 95, fig. 14, *la* = prefrontal.
98, line 9 from bottom, *for* Aix *read* Ain.
103, line 13 from bottom, for *hughi* read *hugii*.
104, line 12 from top, *for* pl. xii. *read* pt. 3, pl. xii.
109, line 6 from top, *for* latest *read* largest.
132, fig. 19. It appears that the nares in *Diplodocus* were not situated on the vertex of the cranium, as in this fig., but formed slits in the anterior region as in Pterodactyles.
140, line 7 from top, *for* 10390 *read* 2544.
145. The length of the femur of *Atlantosaurus* is 1,880 (74 inches), instead of that given in the text, which is taken from the original description.
153, note 4, *for* 400 *read* 440.
179, fig. 32, for *armatus* read *ungulatus*.
185, note 1, *for* 1834 *read* 1833.
199, line 12 from bottom, *for* R. 640 *read* R. 604.
,, line 8 from bottom, *for* 0,870 *read* 0,923.
200, line 14 from bottom, *for* extension *read* expansion.
297, fig. 67. It appears that the forked extremities of the mandible of *Hyperodapedon* did not embrace the premaxillæ, as in Huxley's restoration, but that they were received in the pit on the oral surface of the palate, as in *Chelydra*.

Part II., p. 6, line 8 from top, *for* which are *read* the second of which is.
50. No. R. 224 is described and figured by Owen in his 'History of British Fossil Reptiles,' Ichthyopterygia, p. 176, pl. xxx. fig. 2 (1884), as *Ichthyosaurus longimanus*, of which it is the type. The structure of the paddle closely resembles that of *I. communis*, No. 2001* (p. 44), and also that of *I. breviceps*, No. 43006 (p. 52), and it is probable that the specimen belongs to one of those forms. In Owen's description the specimen is incorrectly stated to be from Barrow.
50. No. R. 1063 is described and figured by Owen, *op. cit.* p. 176, pl. xxx. fig. 1, as *I. fortimanus*, of which it is the type. It is probable that this specimen, which is from Barrow-on-Soar, is really referable to *I. intermedius*, since it approximates very closely in contour to the pectoral limb of No. 14565 (p. 56), with the exception that there are only three bones in the proximal portion of the third transverse row—a variation which may well be due to an individual peculiarity.
110. No. 43166 is from Boulder Clay at Muswell Hill, Middlesex, and therefore not improbably belongs to one of the Post-Liassic species.
129, fig. 39, *for* anterior *read* posterior.
284–286. Bassani, Atti Soc. Ital. Sci. Nat. vol. xxix. pp. 21–24 (1886), identifies *Macromerosaurus plinii* with *Lariosaurus balsami*, and also refers *Neusticosaurus* to *Lariosaurus*, but regards *Pachypleura* as distinct. *Dactylosaurus gracilis*, Gürich, Zeitschr. deutsch. geol. Ges. vol. xxxvi. p. 125 (1884), from the Muschelkalk of Silesia, almost certainly belongs to this group.
299. Add:—*Nothosaurus latifrons*, Gürich, *op. cit.* p. 132; Muschelkalk, Silesia.
300. *Mesosaurus* dates from Comptes Rendus, vol. lx. p. 950 (1865).

# CATALOGUE

OF

# FOSSIL REPTILIA

AND

# AMPHIBIA.

---

## Class **REPTILIA.**

### SYNAPTOSAURIAN BRANCH[1] (*continued*).

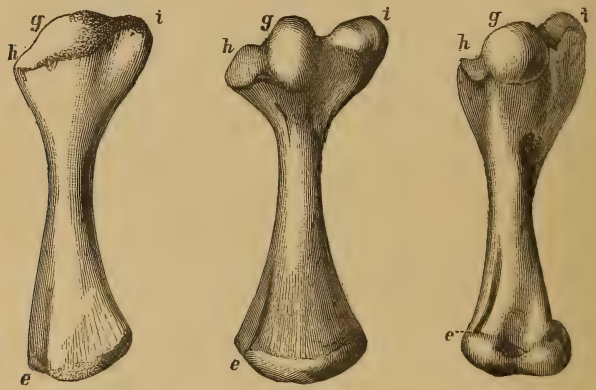
### Order CHELONIA.

Body short and wide, and usually encased in a more or less complete bony shell, of which the ventral portion, or plastron, consists of a few elements of dermal origin; while the carapace may be in great part of endoskeletal derivation. Frequently a horny epidermal exoskeleton. Neck usually short, and if comparatively long with but few vertebræ; tail short or of moderate length. Inferior temporal arcade usually present, and in some instances also a superior arcade; narial aperture single and terminal; premaxilla very small; no parietal foramen in the adult; no transverse bone; a large opisthotic; postorbital welded with postfrontal, and usually the nasal with the prefrontal; mandibular symphysis generally anchylosed. Palate completely closed by junction of the pterygoids with the basisphenoid, and frequently also with one another.

[1] See Part II. p. 118.

In existing forms teeth absent, and the jaws ensheathed in horn. Each rib single-headed, and articulating at the junction of two vertebræ; no cervical ribs[1], and no transverse processes to dorsal vertebræ. Terminations of vertebral centra varying greatly in contour, even in different regions of the column of individual forms. Chevrons usually absent. Pectoral girdle placed within the ribs; precoracoid and scapula rod-like and fused together; precoracoids and coracoids respectively meeting in a ventral cartilaginous symphysis; no sternum or omosternum; clavicles and interclavicle apparently represented by the epiplastrals and entoplastral. Humerus with an ectepicondylar groove, which may be converted

Fig. 1.




Chelonian humeri.—The specimens belong to the left side, and are viewed from the dorsal aspect; all being reduced. A. Genus *non. det.*, from the Kimeridge Clay. ⅔. B. *Chelys fimbriata*, recent. C. *Testudo* sp., recent. *g*, head; *h*, radial process; *i*, ulnar process; *e*, ectepicondylar canal.

into a foramen; limbs variable, being adapted either for walking on land, or webbed, or modified into paddles; in the latter case no hyperphalangism.

It may be observed that the humerus of existing Chelonia is always characterized by its extremely prominent and subglobular head, but that in certain Mesozoic forms (fig. 1, A) the development of the head is much less marked, and the bone departs less widely from a more normal type. It appears from these Jurassic forms that the radial process (fig. 1, *h*) corresponds with the deltoid

[1] Possibly present in *Miolania*.

crest of the Crocodilian humerus; while the ulnar process (*i*) represents the inner tuberosity of the same. Among the Testudinata the radial process in all Pleurodira (fig. 1, B) is comparatively small, while the ulnar process is placed in the same transverse line as the distal surface of the bone. In many existing Cryptodira (fig. 1, C), and more especially the Land-Tortoises, the radial process is developed into a thin plate directed towards the ventral aspect of the bone; while the ulnar process is likewise twisted round to the same side. In the *Chelonidæ* the radial process tends to become aborted, and to attain a position more or less below the level of the head. In the Athecata, which likewise have a straight humerus, the radial process, while descending on the shaft, tends, on the other hand, to attain an excessive development.

The terms employed in the description of the Chelonian shell are those used in Boulenger's 'Catalogue of Chelonians, &c.'[1] The bones placed between the marginal pygal and the last neural are, however, termed suprapygals; and the adjectival termination is applied to the bony elements of the plastron. The horny shields are likewise named after the same manner[2], with the exception that the term caudal is used in place of supracaudal. To obviate the chance of confusion between the sutures of bones and the lines of junction of the horny shields the term sulcus has been applied to the depressions on the shell formed by the latter.

## Suborder I. *TESTUDINATA.*

Carapace mesially composed of expansions of the ribs, and usually also of the dorsal vertebræ, to both of which it is immovably welded. Skull with the parietals giving off vertically descending plates, which unite, either directly, or by the intervention of the columellæ (epipterygoids), with the pterygoids.

The name Testudinata is employed in preference to that of Thecophora, since the latter term (Thecaphora) is used for a group of Hydroid Zoophyta.

### Section I. TRIONYCHOIDEA.

Shell free from pelvis, and (at least in existing forms) sculptured and devoid of epidermal shields; entoplastral chevron-shaped and separating the epi- and hyoplastrals; marginals[3] (when present)

[1] Pages 11–15. [2] *Ibid.* p. 19, fig. 2.

[3] The marginals of the Trionychoidea are regarded by Boulenger as not homologous with those of other Testudinata.

forming an incomplete series at the posterior extremity of the shell, and having no connection with the ribs. Skull with the mandibular articulation and the notched tympanic ring of the Cryptodiran type[1]; the broad pterygoids separated in the median line by the basisphenoid, which joins the palatines anteriorly; the latter meeting in a median suture, owing to the small size of the vomer. Cervical vertebræ elongated, without distinct transverse processes; the eighth articulating to the first dorsal solely by the zygapophyses. Sacral and caudal ribs articulating with the arches of the vertebræ; no chevrons. Four or more phalangeals in the fourth digit. Head retracted after the Cryptodiran manner [1].

## Family TRIONYCHIDÆ.

Skull depressed, with the small orbits directed more or less upwards and approximated towards the nares; the temporal fossæ completely open, and the squamosal and supraoccipital with very long posterior processes. Tympanic cavity completely closed, with the exception of the small aperture for the stapes. Neural bones of carapace with the posterior lateral facet much shorter than the anterior; plastron totally distinct from carapace, with large vacuities. Angle formed by junction of scapula and precoracoid acute. Humerus much curved, being of the same general structure as in the *Chelydridæ* (fig. 32), but with a larger and narrower head.

All the known forms are referable to this family.

### Subfamily TRIONYCHINÆ.

Hyoplastral distinct from hypoplastral; outer extremities of nuchal bone overlying rib supporting first costal bone [2]; pterygoid not uniting with opisthotic to divide posterior aperture of labyrinth; no marginals; sculpture generally vermiculate, or pitted; neurals always well developed.

#### Genus **CHITRA,** Gray [3].

Skull long and narrow, with the orbits placed at the anterior extremity, and the postorbital bar wider than twice the diameter of the orbit. Eight neurals. Hypoplastral with three digitations at postero-external angle. Humerus with ectepicondylar groove forming a long channel on preaxial border of shaft.

[1] *Vide infrà.*

[2] The rib supporting the first costal bone is the second.

[3] Cat. Tortoises Brit. Mus. p. 49 (1844).

## Chitra indica, Gray [1].

Syn. *Trionyx indicus*, Gray [2].

The type and only known species, which is the largest representative of the family, the carapace attaining a length of more than three feet.

*Hab.* India and Burma.

*The following specimen is from the Pleistocene of the Narbada Valley, India.*

**R. 1415.** The imperfect proximal extremity of the second left costal bone of a medium-sized individual. The species is at the present day unknown in the rivers of Western India. *Presented by C. Fraser, Esq.*, 1849.

*The following specimens are from the Pliocene of the Siwalik Hills, India; and, so far as is known, belong to the Cautley Collection. Presented*, 1840.

**39830.** (*Fig.*) The anterior extremity of the carapace of a large individual. Described and figured by the writer in the 'Palæontologia Indica' (Mem. Geol. Surv. Ind.), ser. x. vol. iii. p. 207, pl. xxvii. fig. 1. The specimen shows the nuchal and the first two neurals and costals. Portions of the plastron are shown on the ventral aspect.

**39832.** (*Fig.*) The imperfect carapace. Described and figured, *op. cit.* p. 207, pl. xxvii. fig. 2. Shows the first six neurals (the third imperfect), the first six costals of the right side, and portions of those on the left. In all respects this specimen accords with recent examples.

**39831.** Fragment showing the fourth and fifth neurals, with the proximal extremities of the costals of the right side and the underlying vertebræ.

**R. 884.** Fragment from the dorsal region of the carapace, showing the entire 3rd neural, and portions of the 2nd and 4th, and of the adjacent costals and underlying vertebræ.

**R. 1416.** The imperfect distal extremity of the first right costal of a very large individual.

**R. 1417.** The distal extremity of the second left costal of a smaller individual.

[1] Synopsis Reptilium, p. 47 (1831).—*Trionyx.* [2] *Loc. cit.*

R. 1419. The proximal extremity of the second right costal.

R. 1421. The imperfect distal extremity of the eighth right costal.

R. 885. Slab of sandstone showing the dorsal aspect of the distal extremities of three costals, of which the third is very imperfect.

R. 1422. The distal extremity of a late costal of the left side.

R. 1423. The postero-external extremity of the left hypoplastral of a large individual. The three terminal processes, of which the lower one has lost its extremity, are well shown.

R. 1424. A similar specimen from the opposite side of a still larger individual.

R. 1425. A similar specimen from the right side of a smaller individual. This specimen indicates a carapace about two feet in length.

39829. The right hypoplastral, wanting the outer extremity, of a half-grown individual. Noticed by the writer, *op. cit.* p. 203, where it is incorrectly said to be adult. This specimen is almost indistinguishable from the hypoplastral of a recent specimen in which the length of the carapace is 0,468 (18·5 inches).

R. 1428. The distal extremity of the right humerus of a large individual. The transverse diameter is 0,066 (3·6 inches) against 0,036 (1·43 inches) in the corresponding bone of the above-mentioned skeleton. This specimen differs from all recent examples in the Museum by the conversion of the ectepicondylar groove into a foramen, but this can scarcely be considered a specific character. The characteristic ectepicondylar channel on the shaft is shown.

*The following specimen is from the Pliocene Siwaliks of the Punjab, India.*

R. 1418. The distal extremity of the second left costal of a large individual. Other specimens from the same locality are recorded by the writer, *op. cit.* p. 208, but the species is now unknown in the Indus basin. *No history.*

*The following specimen is said to be from the Siwaliks of Burma.*

44824. The distal half of a costal bone.

*Presented by B. Bright, Esq.*, 1873.

## TRIONYX, Geoffroy [1].

Syn. *Aspidonectes*, Wagler [2].
? *Axestus*, Cope [3].
*Plastomenus*, Cope [4].

The type genus. Skull broad or narrow, with the orbit generally nearer to the temporal fossa than to the nares, and the postorbital bar narrower than the orbit. Usually 7 or 8 neurals. Hypoplastral with two digitations at postero-external angle [5]. Humerus without channel above ectepicondylar groove.

The generic synonymy of the recent forms is given by Boulenger, 'Catalogue of Chelonians, &c.' p. 242 (1889).

The forms from the Eocene and Upper Cretaceous of America described under the name of *Plastomenus* are stated to differ [6] by the stouter and more complete ossification of the hyo- and hypoplastrals, in which the buttresses for the outer digitations are stouter. In the hypoplastral the inguinal border is sharp, and the outer portion of the articular surface for the hyoplastral is considerably thicker. These features, which apparently occur in some of the undermentioned forms, do not seem to be of generic value. Further evidence is also required to prove the distinctness of *Axestus*, since the smooth plastron on which its separation is based occurs in some existing species of *Trionyx*.

The existing American forms have but seven costals, but in all the fossil species, both from the Old and New World, in which the entire carapace is known there are not less than eight of these bones.

### *Group* A.

*Two short neurals between the first pair of costals; eighth costals meeting in the middle line behind the last neural, which, if the two short ones between the first costals be reckoned as a duplication of the normal first, will be the eighth. Symphysis of mandible without oral ridge.*

[1] Ann. du Muséum, vol. xiv. p. 1 (1809).
[2] Syst. Amphib. p. 134 (1830).
[3] Proc. Amer. Phil. Soc. vol. xii. p. 462 (1873).
[4] Sixth Ann. Rep. U. S. Geol. Surv. Terrs. p. 617 (1873).
[5] In one example of *T. hurum* in the Museum there are three of these digitations on one side.
[6] *Vide* Cope, *op. cit.* and Rep. U. S. Geol. Surv. Terrs. vol. iii. p. 124 (1884).

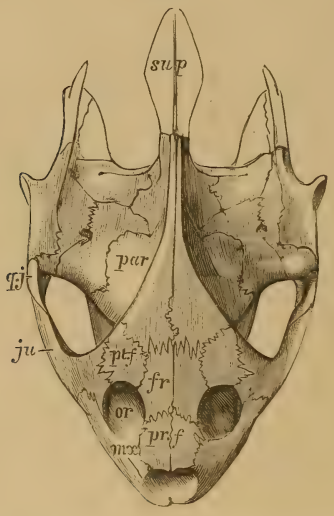
## Trionyx gangeticus, Cuvier[1].

Of large size, with the sculpture coarsely vermiculate, and the plastral callosities very large. Skull (fig. 2) with a short and blunt muzzle, the interorbital bar in the adult narrower than the narial aperture, and the mandibular symphysis short. Hypoplastrals large and flattened.

*Hab.* India.

At the present day the species is known only from the Ganges valley.

Fig. 2.




*Trionyx gangeticus.*—Frontal aspect of the cranium; from the Pleistocene of the Narbada Valley. About $\frac{1}{2}$. *sup*, supraoccipital; *par*, parietal; *ptf*, postfrontal; *fr*, frontal; *prf*, prefrontal; *mx*, maxilla; *ju*, jugal; *qj*, quadratojugal; *or*, orbit. The bone on either side of the supraoccipital is the opisthotic, externally to which is the squamosal. (From the 'Rec. Geol. Surv. Ind.')

**39843.** (*Fig.*) The cranium, imperfect posteriorly; from the Pleistocene of the Narbada Valley. Described and figured by the writer in the 'Palæontologia Indica' (Mem. Geol. Surv. Ind.), ser. x. vol. iii. p. 204, pl. xxv. fig. 3, and also in the 'Rec. Geol. Surv. Ind.' vol. xxii. p. 56, from which the accompanying woodcut is reproduced. This specimen agrees in all respects with recent crania.

*Presented by C. Fraser, Esq.*, 1849.

[1] 'Ossemens Fossiles,' 2nd ed. vol. v. pt. ii, p. 186 (1824).

**R. 1426.** The distal extremity of a costal bone, probably belonging to this species; from the Narbada Valley.

*Presented by C. Fraser, Esq.*, 1849.

**R. 1426 a.** The postero-external angle of the left hypoplastral; from the Narbada Valley. This specimen exhibits the marked flatness characteristic of this species as distinct from *T. hurum*. *Presented by C. Fraser, Esq.*, 1849.

**R. 1426 b.** The left xiphiplastral, wanting the posterior extremity; from the Narbada Valley.

*Presented by C. Fraser, Esq.*, 1849.

## Trionyx hurum, Gray[1].

Smaller than the preceding species. Skull with a longer and more pointed muzzle, the interorbital bar as wide as the nares, and a longer mandibular symphysis. Hypoplastrals much curved externally; carapace with traces of longitudinal ridges.

Var. *sivalensis*.

Characterized by a median and two lateral ridges on the carapace, of which there are only traces in the living form.

*Hab.* India.

**R. 601.** Cast of the plastral aspect of an imperfect shell. The original, which is preserved in the Indian Museum, Calcutta, was obtained from the Pliocene of the Siwalik Hills, and is described and figured by the writer in the 'Palæontologia Indica' (Mem. Geol. Surv. Ind.), ser. x. vol. iii. p. 205, pl. xxvii. fig. 3, without specific name. The plastron accords so closely with that of *T. hurum*, that there seems little doubt that the specimen can only be regarded as a variety of that species.

*Made in the Museum*, 1885.

**R. 1427.** The postero-external angle of a left hypoplastral agreeing generally with the corresponding part of *T. hurum*, but indicating a somewhat larger form than existing individuals; from the Siwaliks. If not referable to this species, this specimen probably indicates an allied form, since it is quite distinct from *T. gangeticus*.

*Cautley Collection. Presented*, 1840

[1] 'Synopsis Reptilium,' p. 47 (1831).

*Group* B.

*A single long neural between the first pair of costals; eighth costals meeting behind the eighth neural. Symphysis of mandible with a median oral ridge.*

**Trionyx phayrei**, Theobald [1].

Carapace coarsely sculptured; eighth costals produced laterally and posteriorly into a projecting point; plastral callosities very slightly developed.

For synonymy see Boulenger's 'Catalogue of Chelonians, &c.,' p. 251.

*Hab.* Burma and (?) Borneo.

**R. 610.** An imperfect carapace belonging either to the present or a closely allied species; from beds which are probably of prehistoric or Pleistocene age at Paken Flat, Borneo. This specimen, which wants the second, third, and fourth neurals, and the last five costals of the left side, agrees in all essential characters with the carapace of *T. phayrei*; although the sculpture is coarser than in either of the two recent examples in the collection of the Museum, and there is also a distinct median ridge in the four last neurals which is not seen in those specimens. In the absence, however, of a large series of recent examples, it is not safe to say that those features are of specific value. There is no evidence of the existence of *T. phayrei* in Borneo at the present day.

*Presented by the Bornean Exploration Committee.*

*Group* C.

*A single long neural between the first pair of costals; usually 7 neurals; the eighth and hinder half of the seventh costals meeting in the middle line* (fig. 3). *Symphysis of mandible, when known, without oral ridge.*

In those cases where the entire carapace is unknown the reference to this group is provisional.

**Trionyx aquitanicus,** Delfortrie [2].

Known only by a detached nuchal, neurals, and costals. Of large

[1] Trans. Linn. Soc.—Zool. vol. x. p. 18 (1868).

[2] Act. Soc. Linn. Bordeaux, vol. xxvii. p. 417 (1869).

size; sculpture coarse and linear; distal portion of ribs very prominent on the under surface of the costals.

*Hab.* Europe (France).

**28904.** A costal bone, imperfect proximally; from the Middle Miocene of Bordeaux (Gironde) France. This specimen accords well with the type costals from the same deposits figured by Delfortrie in the 'Act. Soc. Linn. Bordeaux,' vol. xxvii. pl. xxviii. figs. 20, 21; the extreme prominence of the distal extremity of the rib, well exhibited in fig. 20, is shown very clearly in the present example.

*Purchased*, 1853.

### **Trionyx**, sp.

*Hab.* Europe (England).

**36812 a.** The distal extremity of a costal bone; from the Lower Miocene (Upper Oligocene) of Hempstead, Isle of Wight. The sculpture is fine and linear.

*Presented by S. Laing, Esq.*, 1862.

### **Trionyx gergensi** (Meyer [1]).

Syn. *Aspidonectes gergensi*, Meyer [2].

Imperfectly known.

The undermentioned specimen apparently indicates a species allied to *T. incrassatus* (*infrà*), but with the last costals smaller and narrower, and the sculpture on the edges of the costals and nuchal very imperfectly developed.

The type specimens are from the Miocene of the Mayence basin.

*Hab.* Europe (Germany).

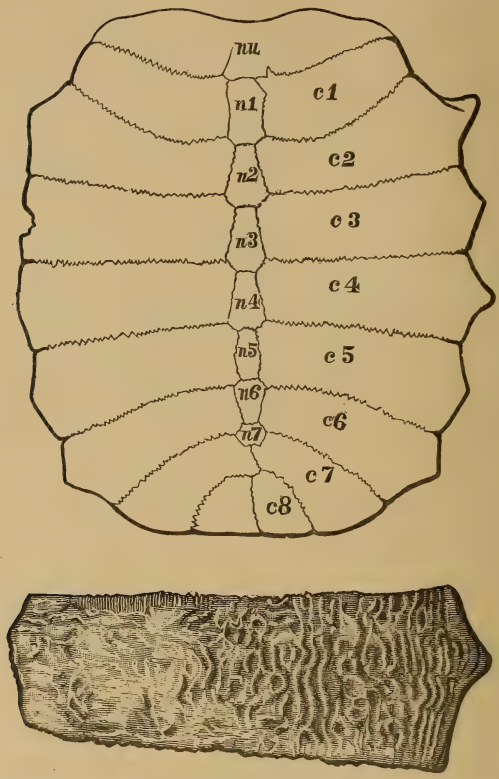
**36765.** The entire carapace of a large and nearly adult *Trionyx*, probably belonging to this species; from the Lower Miocene (Middle Oligocene) of Alzey, Hessen-Darmstadt. This specimen is from the same deposits as the type, but in the absence of figures of the latter its specific identity cannot be certainly proved. The strongly-marked spinous processes on the nuchal, noticed in the description of the type, are broken away, but they were evidently originally

[1] Neues Jahrb. 1844, p. 565.—*Aspidonectes.*

[2] *Loc. cit.*

present, as in the type of *T. incrassatus*. The neural region of the carapace is depressed. The vertebræ remain on the ventral aspect. *Purchased*, 1859.

Fig. 3.




*Trionyx* (*cf.*) *gergensi*.—Carapace; from the Lower Miocene of the Mayence basin. ¼. The fourth right costal with the sculpture is shown on a larger scale below. *nu*, nuchal.

## **Trionyx parisiensis,** Meyer [1].

Known only by a single costal bone, which has a fine sculpture, and is of considerable thickness, with the free margin abruptly truncated. One of the Hordwell forms may be identical with this species.

[1] Palæologica, p. 101 (1832).

R. 1420. Cast of a slab of gypsum, showing the dorsal aspect of a costal bone, imperfect proximally. The original is the type and is preserved in the Paris Museum. It was obtained from the Upper Eocene (Lower Oligocene) of Montmartre, and is figured by Cuvier in the 'Ossemens Fossiles,' 2nd ed. vol. iii. pl. lxxvi. fig. 2.

*Mantell Collection.* *Purchased*, 1838.

### **Trionyx barbaræ**, Owen [1].

Apparently allied to the next species, from which it is distinguished by the more vaulted and ovoid carapace, and the somewhat coarser sculpture on the same; it being assumed that the contour of the carapace in the types of this and the next form is the natural one.

*Hab.* Europe (England).

30409. (*Fig.*) The carapace; from the Upper Eocene (Lower Oligocene) of Hordwell, Hampshire. The type specimen. Described and figured by Owen in his 'Reptilia of the London Clay, &c.' vol. i. pt. i. p. 50, pl. xvi. A.

*Hastings Collection.* *Purchased*, 1855.

R. 1592. A larger imperfect carapace, apparently specifically identical with the preceding specimen; from Hordwell. This specimen shows the same vaulted contour as the type; the borders of the costals being devoid of reticulate sculpture. Some of the neurals are wanting, and the nuchal and several of the costals have been broken.

*Purchased*, 1889.

### **Trionyx henrici**, Owen [2].

Syn. *Trionyx marginatus*, Owen [3].

Carapace moderately depressed, and wide, with comparatively fine reticular sculpture; borders of costals with a more or less defined band devoid of reticular sculpture. Nuchal bone strongly emarginate anteriorly, and highly convex, with the sculptured por-

[1] 'Reptilia of the London Clay, &c.' (Mon. Pal. Soc.), vol. i. pt. i. p. 50 (1849).

[2] *Ibid.* p. 46. The name does not occur in Rep. Brit. Assoc. for 1847, Trans. of Sections, p. 65 (1848), to which reference is made by Owen.

[3] *Ibid.* p. 55.

tion also emarginate, and defined from the unsculptured; lateral dentations of the unsculptured portion indistinct, and a large moiety of this part in advance of the median emargination. Centra of dorsal vertebræ flattened inferiorly.

It is difficult to find satisfactory grounds for specifically distinguishing *T. marginatus* from this species.

*Hab.* Europe (England).

**30407.** (*Fig.*) The carapace, wanting the nuchal bone; from the Upper Eocene (Lower Oligocene) of Hordwell, Hampshire. The type specimen. Described and figured by Owen in his 'Reptilia of the London Clay, &c.' pt. i. p. 46, pl. xvi. In this specimen the first costal is very wide, and the anterior angles of the first neural are not truncated; while the unsculptured bands on the borders of the costals are very indistinct.

*Hastings Collection. Purchased*, 1855.

**30413.** An entire but somewhat smaller carapace, which cannot be specifically distinguished from the preceding; from Hordwell. In this specimen the first costal is narrower than in the type, and the unsculptured bands on the borders of the costals are very distinct. The anterior angles of the first costal are not truncated. The sculpture is rather coarser than in the type. The flattened hæmal surfaces of the dorsal vertebræ are shown. *Hastings Collection.*

**30406.** (*Fig.*) A large carapace, wanting the nuchal; from Hordwell. The type of *T. marginatus*. Described and figured by Owen, *op. cit.* p. 55, pl. xix.*. The unsculptured bands on the costals are very strongly marked, and the sculpture is finer than in the last specimen, and more like ttha of the type. *Hastings Collection.*

**32348.** A nuchal bone; from Hordwell. Figured by Owen, *op. cit.* pl. xvi. fig. 3, as *T. henrici*. In general contour this specimen resembles the nuchal of No. 30413, but has a somewhat finer sculpture. *Hastings Collection.*

**R. 1430.** An imperfect carapace, showing the first five costals of the left side, and the first and second neurals; from Hordwell. The form of the bones corresponds almost exactly with the type, but the sculpture is coarser, and

the unsculptured bands are very distinct. The anterior angles of the first neural are not truncated. *No history.*

**25230.** Portions of a carapace, comprising the first and second neurals, the first three costals of the right side, and the last three on the left; from Hordwell. The sculpture is of the general appearance of that of the type of *T. marginatus.* *Presented by Searles V. Wood, Esq.*, 1850.

**25230 a.** The left half of a nuchal; from Hordwell. This specimen closely resembles No. 32348.
*Presented by Searles V. Wood, Esq.*, 1850.

**R. 1434.** Fragment from the middle region of a carapace, perhaps belonging to this form; from Hordwell. This specimen shows two entire neurals, the corresponding costals of the left side, and the proximal portions of the opposite costals. The unsculptured bands on the costals are of great width. A vertebral centrum is shown. *No history.*

*Specifically undetermined specimens from Hordwell, some of which probably belong to the species last mentioned.*

**30410 c.** A mandible. In the flattened oral surface of the dentary this specimen resembles the mandible of *T. niloticus*, and totally differs from that of *T. gangeticus* and other Asiatic forms; it has no oral ridge. *Hastings Collection.*

**R. 1499.** The imperfect mandible of another species. In the form of the symphysis this mandible comes nearest to *T. hurum*, differing from that of *T. phayrei* in the absence of an oral ridge. If the preceding specimen belong to *T. henrici*, the present one may be referable to *T. planus.*
*Hastings Collection.*

**30403 x.** A large imperfect cervical vertebra. *Hastings Collection.*

**30403 x–1.** Two imperfect cervical vertebræ of smaller size.
*Hastings Collection.*

**R. 1488.** Two imperfect cervical vertebræ agreeing closely with the preceding specimens. *Hastings Collection.*

**R. 1488 a.** An imperfect eighth cervical vertebra. *Hastings Collection.*

**30403 x–2.** The imperfect right side of the pectoral girdle. The extremities of the coracoid and precoracoid, and nearly the whole of the dorsal bar of the scapula, are wanting.
*Hastings Collection.*

**25256 x.** The nearly entire left scapulo-precoracoid.
*Presented by Searles V. Wood, Esq.*, 1850.

**R. 1489.** The nearly entire right humerus. *Hastings Collection.*

**R. 1489 a.** The proximal half of a similar humerus.
*Hastings Collection.*

**R. 1489 b.** The proximal half of a larger right humerus.
*Hastings Collection.*

**R. 1489 c.** A left humerus, somewhat smaller than No. R. 1489.
*Hastings Collection.*

**R. 1489 d.** The proximal extremity of a similar left humerus, in matrix. *Hastings Collection.*

**R. 1490.** An imperfect specimen of the right femur.
*Hastings Collection.*

**25268.** An imperfect right femur.
*Presented by S. V. Wood, Esq.*, 1850.

**25267.** An imperfect left femur.
*Presented by S. V. Wood, Esq.*, 1850.

**30345.** The terminal phalangeal of a pollex. This specimen is more expanded than is usually the case.
*Hastings Collection.*

**30344.** A terminal phalangeal. *Hastings Collection.*

**30343.** Two terminal phalangeals. *Hastings Collection.*

**32350.** A left hypoplastral, with the inner half of the hyoplastral attached. *Hastings Collection.*

**36810.** A smaller left hypoplastral. This specimen is immature.
*Presented by S. Laing, Esq.*, 1862.

**R. 1435.** A small right hypoplastral, with the inner and outer borders imperfect. *Hastings Collection.*

**R. 1436.** A right hypoplastral. The middle of the inner buttress is somewhat thickened. Both this and the preceding specimen are immature. *Hastings Collection.*

**R. 1437.** A left hyposternal. This specimen indicates an individual slightly larger than No. 36810. *Hastings Collection.*

## **Trionyx incrassatus,** Owen [1].

Carapace much depressed, with the neurals below the level of the adjacent portions of the costals, and the sculpture somewhat coarser than in the preceding species, and tending to a pustular type in the neural region. Nuchal slightly emarginate and not very convex, with the lateral dentations of the unsculptured portion distinct, and only a small moiety of this part in advance of the median emargination; limits of sculptured portion not well-defined. No callosity on the entoplastral. Centra of dorsal vertebræ elevated.

The above description depends in part on the correctness of the reference of the second of the undermentioned carapaces to this species.

*Hab.* Europe (England).

**R. 1433.** (*Fig.*) The anterior portion of the carapace; from the Upper Eocene (Lower Oligocene) probably of Hordwell, Hampshire [2]. This specimen may be taken as the type. Described and figured by Owen in his 'Reptilia of the London Clay, &c.' pt. i. p. 5, pl. xviii. It shows the nuchal and two first neurals and the first three costals of either side. The anterior angles of the first neural are truncated; the first costal narrows greatly towards its outer extremity, and the outer margins of the costals are of moderate thickness and bevelled. The inferior surface of the nuchal, and the prominent centrum of the vertebra underlying the first neural are very different from the corresponding parts in *T. henrici*, No. 30413.

*Hastings Collection. Purchased*, 1855.

**30408.** (*Fig.*) The carapace, wanting the nuchal bone; probably from Hordwell. Described and figured by Owen, *op. cit.* p. 5, pl. xvii. In this specimen the first costal is wider than in the preceding example, and the outer borders of all the costals are very thick and abruptly truncated; the latter features being given by Owen as diagnostic of the species. The neurals are much depressed below the costals. *Hastings Collection.*

[1] Reptilia of the London Clay, &c. (Mon. Pal. Soc.), vol. i. pt. i. p. 51 (1849).

[2] Owen states that this and the following specimens are from the Isle of Wight; but they are entered in the Museum Register as from Hordwell.

**30403.** (*Fig.*) A series of associated bones, said to belong to the same individual as No. R. 1433. Figured by Owen, *op. cit.* pl. xix. These specimens comprise the left hypoplastral and outer portion of the hyoplastral, the ento- and epiplastrals, a cervical vertebra, the pectoral girdle, an ilium, the right femur, and a terminal phalangeal. The entoplastral has no sculptured callosity.

*Hastings Collection.*

### **Trionyx planus,** Owen [1].

Known only by the posterior half of the carapace, and perhaps part of the plastron. Sculpture very coarse. Fifth and sixth neurals very narrow; eighth costal more expanded than in any of the preceding species.

The absence of the seventh neural in the type is an individual peculiarity.

*Hab.* Europe (England).

**30410 x.** (*Fig.*) The posterior portion of the carapace, showing the last four costals of either side; from the Upper Eocene (Lower Oligocene) of Hordwell, Hampshire. The type specimen; described and figured by Owen in his 'Reptilia of the London Clay, &c.' pt. i. p. 58, pl. xix. c. The inner portions of the fifth and sixth costals are wanting (although introduced into the figure), but the sixth costals met in the middle line behind the sixth neural.

*Hastings Collection. Purchased,* 1855.

**30410.** The imperfect posterior portion of the carapace; from Hordwell. This specimen has the sculpture in a well-preserved condition, and shows the greater portion of the last five costals of the left side, the last right costal, and the fifth, sixth, and seventh neurals. The only respect in which this carapace differs from the type is in the presence of the seventh neural. *Hastings Collection.*

**R. 922.** Slab of rock showing the dorsal aspect of the imperfect posterior portion of the carapace; from Upper Eocene beds at Barton, Hampshire. The last three neurals and portions of the last four costals are preserved. With the exception that the sculpture has been somewhat abraded, this specimen agrees in all characters with the preceding.

*No history.*

[1] Reptilia of the London Clay, &c. (Mon. Pal. Soc.), vol. i. pt. i. p. 58 (1849).

**30409 a.** (*Fig.*) The inner portion of the conjoint left hyo- and hypoplastrals of an adult *Trionyx* which, from its comparatively coarse sculpture, probably belongs to the present species; from Hordwell. Described and figured by Owen, *op. cit.* p. 59, pl. xix. D. fig. 6. The absence of projections on the inner border is due solely to the age of the specimen. The degree of rugosity of the sculpture bears the same relation to that of the carapace as is the case between the corresponding portions of the shell of *Chitra*. In its relatively large antero-posterior diameter, and in the thickness of the commencement of the outer buttress of the hypoplastral, this specimen approximates to the description of the forms referred to *Plastomenus*.

*Hastings Collection.*

### ** **Trionyx rivosus,** Owen [1].

Probably the young of the preceding species.

Known only by the carapace of a young individual, which is characterized by the presence of a few bold sinuous longitudinal ridges, which are much more prominent than the rest of the sculpture. In this respect the specimen resembles the young of the existing *T. cartilagineus* [2], and also some of the American fossil forms figured by Cope [3] as *Plastomenus*. Traces of similar sculpture remain in the eighth costals of *T. planus*, No. 30410 (p. 18).

*Hab.* Europe (England).

**30405.** (*Fig.*) The posterior part of the carapace of a young individual; from the Upper Eocene (Lower Oligocene) of Hordwell, Hampshire. The type; described and figured by Owen in his 'Reptilia of the London Clay, &c.,' pt. i. p. 56, pl. xviii. A. figs. 1, 2; it shows the last five costals and the sixth neural. *Hastings Collection. Purchased,* 1855.

### **Trionyx bowerbanki,** Lydekker, n. sp.

Very imperfectly known. Nuchal bone emarginate, with the sculptured portion convex, and sharply differentiated by a prominent ridge from the non-sculptured portion; sculpture in the form of small pits, arranged in lines near the periphery. The hypoplastral provisionally referred to this species has a very thick outer buttress.

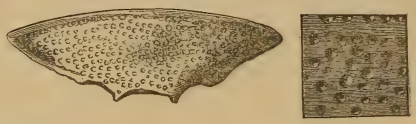
[1] Reptilia of the London Clay, &c. (Mon. Pal. Soc.), vol. i. pt. i. p. 56 (1849).

[2] = *T. ornatus*, Günther, 'Reptilia of British India,' pl. vi. fig. B.

[3] Tertiary Vertebrata of the West (Rep. U. S. Geol. Surv. Terrs. vol. iii.), pl. xviii. figs. 9–12.

The sculpture of the nuchal is finer than that of the costal from the London Clay on which *T. pustulatus*, Owen [1], was founded. The sculpture of the seventh costal from Bracklesham figured in Dixon's 'Geology of Sussex,' pl. xii. fig. 15, which very probably belongs to the present form, is also different from that specimen. The nuchal resembles that of *T. stiriacus*, Peters [2], from the Middle Miocene of Styria; but the much lower horizon of the present form

Fig. 4.



*Trionyx bowerbanki*.—Nuchal bone; from the Middle Eocene of Bracklesham. ½. In the figure on the right the sculpture is shown of the nat. size.

indicates of itself in all probability a specific distinction, and the hypoplastral mentioned below is decidedly different from that of *T. stiriacus*, in which the costals have a ridged sculpture.

*Hab.* Europe (England).

38960. (*Fig.*) The nuchal bone, slightly imperfect anteriorly; from the Middle Eocene of Bracklesham, Sussex. The type specimen; figured in the accompanying woodcut. This specimen, which appears to be adult, indicates a comparatively small species, agreeing approximately in size with *T. hurum*. *Bowerbank Collection. Purchased*, 1865.

33198. (*Fig.*) The right hypoplastral of a small subadult *Trionyx* probably belonging to this species; from Bracklesham. Figured by Owen in his 'Reptilia of the London Clay, &c.' pt. i. pl. xix. D. fig. 7 (reversed). The nature of the sculpture agrees fairly well with that of the nuchal, but the contour of the inferior border differs markedly from that of the hypoplastral of *T. styriacus* figured by Peters, *op. cit.* pl. vi. figs. 3, 4. The inner surface of the greater part of the outer buttress is broken away, but the base of this buttress has the marked thickness of the American forms described as *Plastomenus*.

*Dixon Collection. Purchased*, 1851.

[1] Reptilia of the London Clay, &c. (Mon. Pal. Soc.), vol. i. pt. i. p. 60, pl. xix. B. figs. 7, 8 (1849).

[2] Denkschr. k. Ak. Wiss. Wien, vol. ix. pt. ii. p. 12, pl. vi. fig. 2 (1855).

*Some or all of the following specimens from Bracklesham may belong to this species.*

**38962.** An imperfect eighth cervical vertebra belonging to a large individual. *Bowerbank Collection.*

**33237.** The arch of a cervical vertebra.
*Hastings Collection. Purchased*, 1855.

**38999.** A sacral vertebra. *Bowerbank Collection.*

**38968.** A left humerus, imperfect at the two extremities.
*Bowerbank Collection.*

**R. 1431.** A right humerus. *No history.*

### **Trionyx,** sp.

The undermentioned specimen differs from *T. pustulatus*, Owen, from the same deposits, in the nature of the sculpture.

*Hab.* Europe (England).

**33303.** The imperfect distal extremity of a costal; from the London Clay (Lower Eocene) of the Isle of Sheppy.
*Purchased. About* 1858.

### **Trionyx vittatus,** Pomel[1].

Of very large size, approaching the dimensions of *Chitra indica*. Sculpture very coarse, in the form of short and irregular ridges; absent on the greater portion of the nuchal, and from the distal part of the costals.

*Hab.* Europe (France).

**8775.** Part of the distal extremity of a costal, with a fragment of another costal attached; from the Lower Eocene of L'Oise, France. This specimen agrees with the costals of the carapace figured by Gervais in his 'Zool. et Pal. Françaises,' pl. lii., in which the antero-posterior diameter of the third costal is 0,115 (4·53 inches). All the known specimens are from the same deposits.
*Mantell Collection. Purchased*, 1838.

### **Trionyx,** sp.

*Hab.* Africa.

**R. 52.** The imperfect distal portion of a costal bone; from beds of unknown (? Tertiary) age at Chalon, in the Arabian

[1] Arch. Sci. Phys. Nat. vol. iv. p. 328 (1847).

desert. This specimen belonged to a large and very old individual; the costal bone having far outgrown the extremity of the rib.

*Presented by Sir R. Owen, K.C.B.*

## Genus **AULACOCHELYS,** Lydekker [1].

Distinguished by the deep groove traversing the thickened distal extremity of the costals and the outer border of the hypoplastral.

### **Aulacochelys circumsulcata** (Owen [2]).

Syn. *Trionyx circumsulcatus,* Owen [3].

The type and only described species.
*Hab.* Europe (England).

**30404.** (*Fig.*) A costal bone; from the Upper Eocene (Lower Oligocene) of Hordwell, Hampshire. The type specimen; described and figured by Owen in his 'Reptilia of the London Clay, &c.' pt. i. p. 59, pl. xix. B. figs. 1–3.

*Hastings Collection. Purchased,* 1855.

**33198 a.** The postero-external extremity of a right hypoplastral probably belonging to this or an allied form; (?) from Hordwell. There is a deep groove in this specimen on the outer border, corresponding with the one in the costal.

*Dixon Collection. Purchased,* 1851.

## Subfamily EMYDINÆ.

Hyoplastral welded with hypoplastral; outer extremity of nuchal underlying first costal; pterygoid sending an upward process to join the opisthotic, and thus dividing the posterior aperture of the labyrinth into two foramina; marginals present or absent; sculpture tuberculate; neurals sometimes absent.

## Genus **EMYDA,** Gray [4].

A prenuchal marginal bone; neurals usually 7; 7th and 6th costals uniting in the middle line, the latter pair being very large; a series of posterior marginals; plastron with seven callosities.

[1] Ann. Mag. Nat. Hist. ser. 6, vol. iii. p. 53 (1889). On p. 273 of the same volume Baur states that the character on which this genus is founded is merely individual.

[2] Reptilia of the London Clay, &c. (Mon. Pal. Soc.), vol. i. pt. i. p. 59 (1849).—*Trionyx.* [3] *Loc. cit.*

[4] Synopsis Reptilium, p. 49 (1831); also Catalogue of Tortoises in British Museum, p. 46 (1844).

### Emyda vittata, Peters [1].

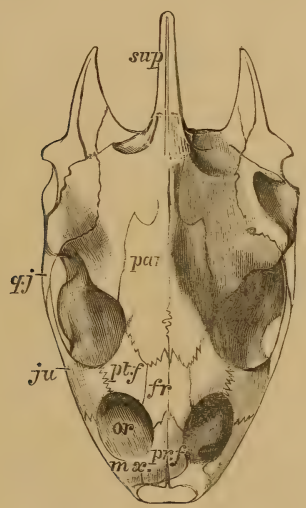
Syn. *Emyda ceylonensis*, Gray [2].

Distinguished from the typical *E. granosa* (Schoepff) by the generally larger size of the ento- and xiphiplastral callosities, together with certain differences of coloration. Whether these characters are really specific is doubtful (see Boulenger, 'Catalogue of Chelonians, &c.' p. 270).

Some of the fragmentary specimens mentioned below may be referable to *E. granosa*, but in the absence of any decisive evidence on this point they are provisionally included under this specific heading, since the best preserved of the undermentioned specimens of the shell is undoubtedly referable to this form.

*Hab.* India and Ceylon.

Fig. 5.




*Emyda* (*cf.*) *vittata*.—Frontal aspect of the skull; from the Siwaliks of Perim Island, Gulf of Cambay. ½. Letters as in fig. 2. (From the 'Rec. Geol. Surv. Ind.')

**R. 221.** (*Fig.*) The skull of a full-grown individual of this or an allied species; from the Pliocene Siwaliks of Perim Island, Gulf of Cambay, India. This specimen, which has been somewhat damaged by rolling, agrees in all respects with the skulls of the existing form, showing very clearly the

[1] Monatsb. k. preuss. Ak. Wiss. 1854, p. 216.

[2] Cat. Shield Reptiles, pt. i. p. 64 (1855).

narrow interorbital bar, and the abrupt deflection of the nasal region characteristic of the genus. It is figured by the writer in the 'Rec. Geol. Surv. Ind.' vol. xxii. p. 56; from whence the accompanying woodcut is reproduced.

*Purchased*, 1882.

**39618.** (*Fig.*) The imperfect shell of an adult individual; from the Pliocene of the Siwalik Hills, India. Described and figured by the writer in the 'Palæontologia Indica,' ser. x. vol. iii. p. 197, pl. xxvi. fig. 1. The plastron is well preserved and shows the large entoplastral callosity distinctive of this species. Nearly all the peripheral bones are wanting from the posterior border of the carapace.

*Presented by General Sir W. E. Baker.*

**39833.** The imperfect shell of an equally large individual; from the Siwalik Hills. Noticed by the writer, *op. cit.* p. 198. The plastron has been crushed in, and the entoplastral callosity is wanting, so that the specimen cannot be specifically distinguished from *E. granosa*.

*Cautley Collection. Presented*, 1840.

**R. 1442.** The right half of the nuchal bone of a very large individual; from the Pleistocene of the Narbada Valley, India.

*Presented by C. Fraser, Esq.*, 1849.

**R. 1441.** The imperfect conjoint hyo- and hypoplastral of the right side; from the Siwaliks. *Cautley Collection.*

**R. 1441 c.** The imperfect right half of the nuchal; from the Siwaliks. *Cautley Collection.*

**R. 1441 b.** The right anterior marginal bone; from the Siwaliks. Closely resembles the specimen figured by the writer, *op. cit.* pl. xxvi. fig. 4. *Cautley Collection.*

**48445.** A smaller specimen of the same bone; from the Siwaliks. *Cautley Collection.*

*The following specimens may be specifically distinct.*

**R. 1441 a.** The anterior extremity of the right anterior marginal bone of a large form; from the Siwaliks.

*Cautley Collection.*

**R. 1441 d.** The anterior extremity of the homologous bone; from the Siwaliks. *Cautley Collection.*

## Section II. CRYPTODIRA.

Shell with the plastron unconnected with the pelvis; generally covered with epidermal shields; entoplastral (when present) oval, rhomboidal, or T-shaped, and not separating the epi- from the hyoplastral; a full series of marginals articulating with the ribs. Mesoplastral absent in all known forms (*Pleurosternum* and its allies being referred to a distinct section). Skull with quadrate articulating with a concavity in mandible; posterior border of tympanic ring with distinct notch; pterygoids in contact, narrow, and laterally emarginate, and extending forwards to join the vomer, which divides the palatines. Cervical vertebræ of moderate length, with rudimentary or no transverse processes; sacral and caudal ribs articulating both with arches and centra of vertebræ. Not more than three phalangeals in the digits. Head retracted by curvature of the neck in a vertical plane.

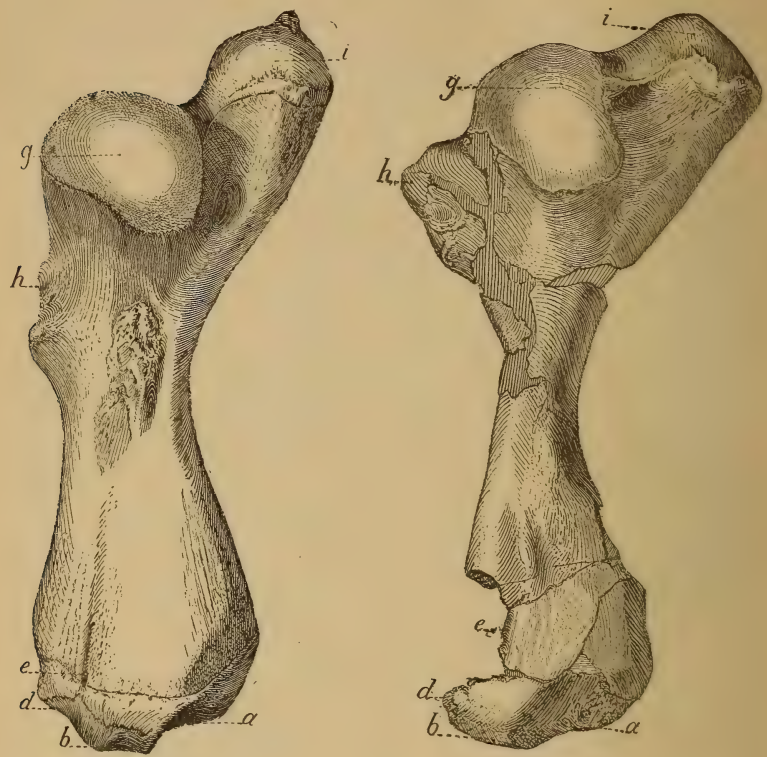
The ossification of the shell may or may not be complete, and the plastron may in some cases be free from the carapace; occasionally the shell may be sculptured, and in some instances may also lose its epidermal shields. In the great majority of cases an intergular shield is wanting in the plastron. Very generally, moreover, the neural and suprapygal bones form a complete series, although there are numerous exceptions. The humerus is subject to great variation in form. For details as to the structure of the skull and shell see Boulenger, 'Catalogue of Chelonians, &c.,' pp. 11–18.

## Family CHELONIDÆ.

Ossification of shell more or less incomplete; plastron distinct from carapace, retaining, at least for a long period, larger or smaller vacuities, and with digitate lateral extremities; nuchal without costiform processes; carapace frequently cordiform, and in some cases with the antero- and postero-lateral surfaces of the hexagonal neurals subequal. Caudal vertebræ procœlous; cervicals very short. Skull with temporal fossa completely roofed over; squamosal joining parietal, and the latter articulating by a very long suture with postfrontal; quadratojugal entering into formation of tympanic ring; tympanic cavity completely open posteriorly; bones of palate developing palatal plates to floor the narial passage. Scapula and precoracoid forming a very obtuse angle at their junction; humerus (fig. 6) more or less flattened, with the axis of the head generally more or less nearly coincident with that of the shaft, and the radial process relatively small and placed entirely, or to a great extent,

below the level of the head, and approximately in the same plane as the ulnar process. An obturator foramen in old specimens.

Fig. 6.




A B

Dorsal aspect of the left humerus of (A) *Chelone mydas* and of (B) *Lytoloma crassicostatum*. *a*, entocondyle; *b*, ectocondyle; *d*, ectepicondyle; *e*, ectepicondylar groove; *g*, head; *h*, radial (lateral) process; *i*, ulnar (mesial) process. (*After Dollo.*)

Limbs modified into paddles, in which the phalangeals may be devoid of condyles, and the terminal claws reduced to one or two. Supramarginal shields are present, and there may be an intergular.

In the cordiform carapace of many forms the *Chelonidæ* agree with the *Acichelyidæ*, and some members of both families differ from all other Chelonia in that the anterior and posterior lateral surfaces of the neurals are subequal; from which it may be argued that

there is a considerable probability that the one family is the descendant of the other. Both the nature of the roof over the temporal fossa and the presence of the intergular shield in some *Chelonidæ* appear to be archaic features; the former, at least, being found to a greater or less extent in the *Acichelyidæ*. The open tympanic ring may likewise be regarded as an archaic feature [1].

## Genus **CHELONE**, Brongniart [2].

Including:—*Cimo*[*lio*]*chelys*, Owen [3].
*Allopleuron*, Baur [4].

Skull (fig. 7) comparatively long, narrow, with the orbits lateral, the nares more or less nearly vertical, and usually no occipital

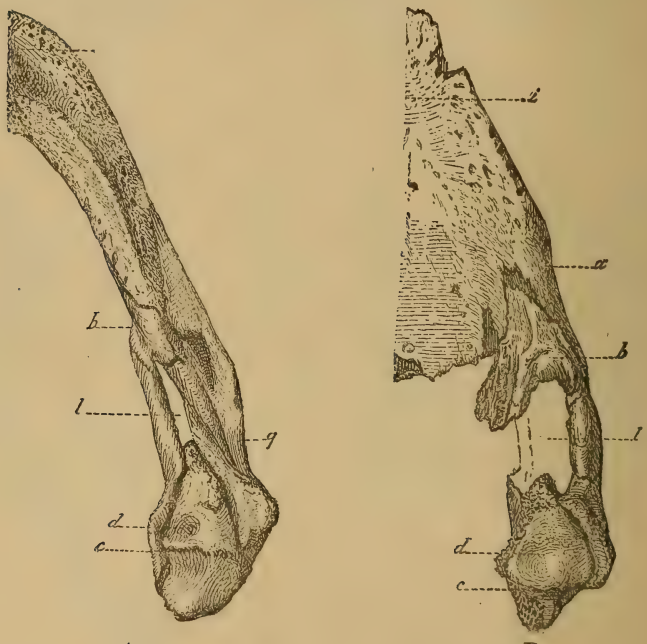
Fig. 7.

*Chelone imbricata*.—Palatal and frontal aspects of the cranium. Reduced. (From Boulenger's 'Catalogue of Chelonians.')

[1] See Baur, Ann. Mag. Nat. Hist. ser. 6, vol. iii. p. 60 (1889).
[2] Bull. Soc. Philom. vol. ii. p. 89 (1800).—Amended.
[3] Rep. Brit. Assoc. for 1841, p. 176 (1842).
[4] Science, vol. xi. p. 144 (1888).

shield [1]. Palate with tall, thin, alveolar walls, and a low ridge on either side, which is continued across the median groove; pterygoids long, not much expanded anteriorly, with the lateral borders posteriorly emarginate, and the ectopterygoid processes, if distinct, placed posteriorly to the antero-external angles; palatal apertures of temporal fossæ antero-posteriorly elongated; posterior nares in anterior third of cranium; vomer of moderate length, joining with the short premaxillæ. Symphysis of mandible relatively short, convex inferiorly, with the oral surface ridged; the length of the postsymphysial portion of the rami usually exceeding twice that of

Fig. 8.



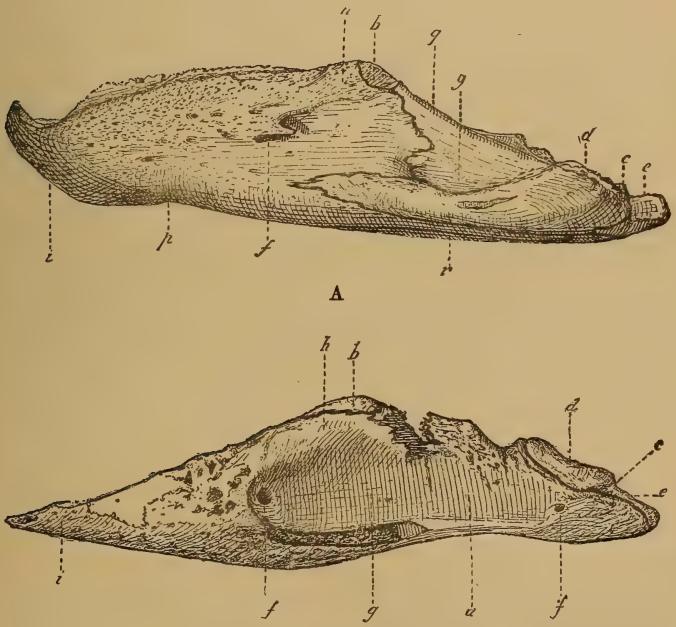

Oral aspect of the right ramus of the mandible of (A) *Chelone mydas* and of (B) *Lytoloma crassicostatum*. *a*, dentary; *b*, coronoid; *c*, articular; *d*, surface for quadrate; *i*, symphysial region; *n*, insertion of genio-hyoid muscle. A is ⅔. (*After Dollo.*)

[1] The shield here termed occipital is equivalent to the interoccipital of Owen ('Reptilia of the London Clay, &c.,' 1849), while the sincipital of that writer is here termed interparietal.

the symphysis. Shell cordiform, or pointed at both extremities, with four costal shields; the plastral vacuities persisting for a long period; epiplastrals very broad; entoplastral long and dagger-shaped; xiphiplastrals slender, and uniting only at their distal extremities. Coracoid long and slender, with but slight distal expansion. Humerus (fig. 6, A) with the head placed almost directly above the long axis, the shaft much flattened and scarcely curved, the ulnar process rising much above the head, and the radial process not connected with the head. Terminal phalangeals flattened. An intergular. The skull is very small in proportion to the shell and limb-bones, and the neurals of the carapace are frequently elongated.

For the generic synonymy of the two existing species see Boulenger, ' Catalogue of Chelonians, &c.' p. 180.

Fig. 9.




Outer aspect of the left ramus of the mandible of (A) *Chelone mydas* and of (B) *Lytoloma crassicostatum*. *e*, postarticular process; *f*, vascular foramen; *g*, masseteric fossa; *h*, coronoid process; *p*, expansion near symphysis; other letters as in fig. 8. (*After Dollo.*)

### Chelone girundica, Delfortrie[1].

Equal in size to the existing forms, with which it agrees in the structure of the carapace; the costals extending a long distance onto the slender ribs. Neural bones long and narrow, with the antero-lateral surfaces much shorter than the postero-lateral. The epiplastrals figured by the founder of the species approach nearer to those of *C. imbricata* than to *C. mydas*; and these bones, together with the imperfect ossification of the shell in mature individuals, indicate that the species belongs to *Chelone* rather than *Thalassochelys*.

The species attained dimensions fully equal to those of *C. mydas*, but the skull is unknown and the carapace known by detached bones.

*Hab.* Europe (France).

**32351.** The fifth right costal bone and rib of an immature individual; from the Middle Miocene of Bordeaux (Gironde), France. This specimen accords in all characters with the detached type costals from the same deposits figured by Delfortrie in the 'Act. Soc. Linn. Bordeaux,' vol. xxvii. pl. xxi. *et seq.* *Hastings Collection.* *Purchased*, 1855.

### Chelone (?), sp.

There is at present no evidence to show whether the undermentioned specimens belong to the present or one of the allied genera.

*Hab.* Europe (England).

**30410 d.** The imperfect left scapulo-precoracoid of a medium-sized Turtle; from the Upper Eocene (Lower Oligocene) of Hordwell, Hants. *Hastings Collection.* *Purchased*, 1855.

### Chelone hoffmanni, Gray[2].

Syn. *Chelone camperi*, Owen[3].
*Allopleuron hoffmanni*, Baur[4].

The type of *Allopleuron*.

Of very large size. Skull approximating to that of *C. imbricata*, but with a shorter and wider palate and a wider mandible, in which the symphysis is shorter and flatter and has no distinct prominence

[1] Act. Soc. Linn. Bordeaux, vol. xxvii. p. 400 (1869).—*Chelonia.*
[2] Synopsis Reptilium, p. 54 (1831).—*Chelonia.*
[3] Cretaceous Reptilia (Mon. Pal. Soc.), pt. i. p. 9 (1851).
[4] Science, vol. xi. p. 144 (1888).

at the posterior border of the oral surface. Carapace long and narrow, with deeply emarginate nuchal; neurals comparatively short and wide, with the antero- and postero-lateral surfaces of subequal length, and with a strong keel; costals long antero-posteriorly, and extending only a short distance down the ribs, which are slender and sharply defined; marginals long, and the posterior ones with the free border entire. In consequence of the form of the neurals the intercostal sutures join the middle of the sides of the neurals.

The contour of the mandibular symphysis approximates to that obtaining in *Argillochelys*, but the pterygoids, as figured by Winkler ('Tortues Fossiles,' pl. ix.), are of the type of those of *Chelone*. The bones figured by Winkler, *op. cit.* pl. x., as the coracoid belong to the pelvic girdle. There is no evidence to show that the fragments from the English Chalk referred provisionally by Owen to this species are rightly named. A fine example of the cranium is figured by Ubaghs in the 'Bull. Soc. Belg. Géol.' vol. ii. pls. x.–xiii.

*Hab.* Europe (Holland).

*The following specimens were obtained from the Uppermost Cretaceous of Maastricht, Holland; and, unless the contrary is stated, belong to the Van Breda Collection. Purchased*, 1871.

**42913.** Slab showing the anterior and left lateral aspect of the imperfect skull, a large portion of the marginal region of the carapace, and portions of the plastron and pelvis. The general contour of the cranium resembles that of *C. imbricata*.

**42889.** (*Fig.*) Slab showing the oral aspect of the imperfect mandible. Figured by Winkler in his 'Tortues Fossiles conservées dans le Musée Teyler, etc.' (Haarlem, 1869), pl. xiv. figs. 46, 47. The symphysis is damaged, but its relative shortness is well shown.

**42890.** The mandible, imperfect posteriorly. The symphysis has been somewhat waterworn, but exhibits its characteristic features.

**42891.** The symphysial region of the mandible, with the oral surface concealed by matrix.

**42892.** The imperfect symphysis of the mandible. As in the preceding specimens, the summits of the alveolar walls have been worn away.

**42997.** Slab showing the occipital and palatal aspects of the imperfect hinder portion of the cranium. The palatines, the left quadrate, and the bones surrounding the foramen magnum are well preserved. The general features are similar to those of *C. imbricata*, more especially the position of the epipterygoid processes. The form of the exoccipitals and opisthotic and the contour of the notch forming the posterior aperture of the otic canal are essentially the same as in existing species of *Chelone*, as distinct from *Thalassochelys*.

**42910–11.** (*Fig.*) A split slab showing the imperfect carapace. Figured by Winkler, *op. cit.* pl. xiii. figs. 42, 43. Nearly the whole outline is displayed; and there remain most of the bones of the posterior portion, part of the nuchal, the anterior neurals, and the corresponding costals of the left side. Since this specimen agrees in relative size with the undermentioned pelvis, it would appear to indicate an approximately adult individual.

**42915.** Slab showing the dorsal aspect of the anterior and median regions of the carapace. This specimen shows part of the nuchal, the anterior neurals, two of the costals, and some marginals.

**42965 a.** Slab exhibiting the dorsal aspect of the anterior part of a large carapace. The nuchal, the first neural, and the anterior marginals are exhibited.

**42899.** (*Fig.*) Slab exhibiting on one side the dorsal aspect of the posterior extremity of the carapace, and on the other the ventral aspect of several caudal vertebræ. Figured by Winkler, *op. cit.* pl. xiv. figs. 44, 45.

**42896.** Slab showing the dorsal side of a slightly imperfect neural bone.

**40173.** Slab showing the dorsal side of a neural, and the ventral side of an imperfect costal. *Purchased*, 1865.

**42965.** The anterior extremity of the left side of the carapace, with part of the dorsal surface concealed by matrix.

**R. 921.** The nearly entire nuchal, with the ventral surface embedded in matrix. *No history.*

**42897.** A lateral marginal.

**42898.** A marginal, with the cavity occupied by matrix.

**42968.** Slab showing the postero-internal portion of the left hypoplastral.

**42969.** Fragment of the plastron, in matrix.

**42967.** Slab showing the ventral aspect of two large dorsal vertebræ in apposition.

**42964.** Slab exhibiting the ventral aspect of six more or less imperfect caudal vertebræ. These specimens seem to indicate a long tail, and probably therefore belonged to a male individual.

**42895.** (*Fig.*) A portion of the sacrum, in matrix. Figured by Winkler, *op. cit.* pl. xiv. fig. 49.

**42912.** Three portions of a slab, showing some imperfect cervical vertebræ, and the left side of the pectoral girdle in an imperfect condition.

**42914.** Slab with portions of marginals, imperfect cervical vertebræ, and the right side of the pectoral girdle, with the ventral aspect exposed. The scapulo-precoracoid is imperfect; the coracoid has the narrow elongated form characteristic of existing species.

**42902.** The left scapulo-precoracoid of a half-grown individual. The two extremities are broken off, and the glenoidal surface is imperfect.

**42903.** A nearly similar specimen of the opposite side.

**42904.** Slab showing the dorsal aspect of the right side of the pectoral girdle of a considerably larger individual. The distal portions of the scapula, precoracoid, and coracoid are wanting.

**42971.** The imperfect right humerus, in a crushed condition. The general proportions appear to be very similar to those of existing forms.

**42893.** (*Fig.*) Slab showing the ventral aspect of the entire left forearm and manus. Figured by Winkler, *op. cit.* pl. xiv. fig. 50.

**42894.** (*Fig.*) Slab showing the dorsal aspect of the imperfect pelvis, together with lumbar vertebræ and portions of the plastron. Pelvis figured by Winkler, *op. cit.* pl. xiv. fig. 48. The pubes are nearly entire, and from their complete ossification at the anterior extremity indicate a nearly or fully adult individual.

**42966.** The imperfect proximal extremity of the left femur.

## Chelone benstedi (Mantell [1]).

Syn. *Emys benstedi*, Mantell [2].
*Cimo[lio]chelys benstedi*, Owen [3].

The type of *Cimoliochelys*. Provisionally included in *Chelone*.

Known only by young specimens, in which the carapace is very long and narrow; the neurals long and narrow, with the two lateral surfaces ill-defined; costals passing imperceptibly into the broad ribs; marginals very short, and the posterior ones with the free border deeply notched. The intercostal sutures coincide with the interneural sutures.

*Hab.* Europe (England).

**28706.** (*Fig.*) The imperfect shell of a young individual, with the ventral surface embedded in matrix; from the Lower Chalk of Burham, Kent. The type specimen; figured by Mantell in the 'Phil. Trans.' 1841, pls. xi., xii., and also by Owen in his 'Cretaceous Reptilia' (Mon. Pal. Soc.) pt. i. pls. i. and ii. On lifting off the middle of the carapace the right coracoid is seen underlying the vertebræ; this bone being of the longer slender type characteristic of *Chelone*, as distinct from the allied genera.

*Mantell Collection. Purchased*, 1853.

**39112.** (*Fig.*) A carapace agreeing closely in size with the preceding; from the Middle Chalk of Kent. The anterior portion is wanting, and the marginals are displaced and thrust beneath the ends of the ribs. Figured by Owen, *op. cit.* pl. iii. The contour both of the neural bones and of the vertebral shields is distinctly shown.

*Bowerbank Collection. Purchased*, 1865.

**36751.** The posterior extremity of a very similar specimen; from the Chalk of Wouldham, near Rochester, Kent. This specimen shows the pygal, suprapygals, the posterior marginals, and the extremities of the ribs of the left side. The notching of the marginals is very clearly shown.

*Purchased*, 1862.

**R. 251.** Fragment of chalk showing the hinder marginals of the right side and some detached costals of an immature individual; from the English Chalk.

*Egerton Collection. Purchased*, 1882.

[1] Phil. Trans. for 1841, pl. xi.—*Emys*.
[2] *Loc. cit.*
[3] Rep. Brit. Assoc. for 1841, p. 176 (1842).

**49923.** Fragments of the shell of an immature individual; from the Chalk of Glynde, Sussex.

*Capron Collection. Purchased*, 1879.

**R. 1494.** Fragment of chalk showing two posterior costals of the left side and a marginal, belonging to a larger individual than any of the preceding; from Kent. *No history.*

**47210.** Fragment of rock showing the dislocated hyo- and hypoplastrals, and two imperfect costals of a young turtle probably referable to this species; from the Gault of Folkestone, Kent. The bones preserved correspond closely with those of the Chalk specimens.

*Gardner Collection. Purchased*, 1876.

### **Chelone,** sp.

Known only by fragments, which indicate a form fully as large as *C. hoffmanni*. The precoracoid differs somewhat in contour from the corresponding bone of that species, and the coracoid is more curved. If the undermentioned costal belong to this form it would indicate that it cannot be the adult of *C. benstedi*.

*Hab.* Europe (England).

**25960.** The imperfect left half of the pectoral girdle; from the Lower Chalk of Dover, Kent. The dorsal portion of the scapula is wanting, but the precoracoid is entire. The length of the latter up to the anterior border of the scapula is 0,316 (12·5 inches). The coracoid is imperfect at both extremities, but when entire would appear to have been of the long and slender type characteristic of *Chelone*.

*Dixon Collection. Purchased*, 1851.

**36813.** Several masses of rock containing a number of broken bones; from the Chalk near Rochester, Kent. Among these bones may be observed portions of the plastron, together with an imperfect scapulo-precoracoid and coracoid. The scapulo-precoracoid is larger than that of the preceding specimen. The coracoid comprises the distal portion, which accords well with the coracoid of the preceding specimen. It is thus shown that the entire coracoid was more curved than in existing species; in the young of *C. benstedi* the coracoid is straighter, which apparently indicates the specific distinctness of the present form. *Purchased*, 1862.

49918. Fragment of chalk showing the inner surface of the first costal bone of a medium-sized turtle which may perhaps belong to this form; from the Lower Chalk near Lewes, Sussex. In form, and also in the double articular surface for the first and second neurals, this specimen agrees with *C. hoffmanni*, and differs from *C. benstedi*.

*Capron Collection. Purchased*, 1879.

### **Chelone jessoni,** Lydekker[1].

An imperfectly known large form, with which the preceding is not improbably specifically identical. Known typically by the mandible, which comes nearest in general characters to that of *C. imbricata*, having a long and narrow symphysis, with a prominence near the posterior border, but considerably deeper and more massive, with a more sudden descent from the beak to the inferior surface, and a median oral ridge approximating to that of *C. mydas*.

There is at present no decisive evidence to show that this form is specifically distinct from *C. benstedi*, but if it be identical with the unnamed form mentioned above there is a probability that such is the case. The reference to the present genus is provisional.

*Hab.* Europe (England).

47209. The imperfect palatal region of the cranium of a very large turtle probably referable to this species; from the Gault of Folkestone, Kent. The palate, which appears to have been ridged, agrees in its narrow form with the undermentioned mandibles. This specimen is noticed by the writer in the 'Quart. Journ. Geol. Soc.' vol. xlv. p. 231.

*Gardner Collection. Purchased*, 1876.

R. 1497. Cast of the symphysis of a mandible agreeing in size with the preceding specimen, and almost certainly referable to the same species. The original was obtained from the Cambridge Greensand, and is in the possession of T. Jesson, Esq.; it is noticed by the writer, *op. cit.* p. 231.

*Made in the Museum*, 1889.

35186 b. (*Fig.*) The symphysis of a similar but somewhat smaller mandible; from the Cambridge Greensand. The type. Figured by the writer, *op. cit.* p. 232, fig. 1. *Purchased*, 1859.

46372. An imperfect mandibular symphysis agreeing very closely with the preceding specimen; from the Cambridge Greensand. *Cunnington Collection. Purchased*, 1875.

[1] Quart. Journ. Geol. Soc. vol. xlv. p. 231 (1889).

**41672.** The symphysis and part of the left ramus of a smaller mandible of the same general type as the preceding; from the Chalk of Halling, Kent. This specimen, if not specifically the same as the foregoing mandibles, apparently indicates a closely allied form.

*Toulmin-Smith Collection. Purchased*, 1869.

**39114.** An imperfect mandible, in matrix, apparently specifically identical with the preceding specimen; from the Chalk of Halling, Kent. Figured by Owen in his 'Cretaceous Reptilia,' pt. i. pl. vii. A. fig. 6.

*Bowerbank Collection. Purchased*, 1865.

**35385.** The centrum of a posterior cervical vertebra, which from its large size may very probably belong to the same form as the above-mentioned mandibles from the same horizon; from the Cambridge Greensand. *Purchased*, 1859.

**35203.** The imperfect proximal extremity of a small left humerus provisionally referred to this form; from the Cambridge Greensand. This specimen agrees approximately in relative size with the type cranium; it differs from the humerus of *Lytoloma cantabrigiense* (p. 69) and agrees with that of *Chelone* in the sharp single ridge formed by the radial process, and probably also by the lesser constriction of the shaft. *Purchased*, 1859.

**35205.** The proximal extremity of a similar but smaller left humerus; from the Cambridge Greensand.

*Purchased*, 1859.

**35206.** The proximal extremity of a still smaller humerus, apparently of the same type; from the Cambridge Greensand.

*Purchased*, 1859.

*Specimens which may belong either to* Chelone *or* Lytoloma.

A. *From the Chalk.*

**49008.** (*Fig.*) Fragments of costal bones, in matrix; from the Middle Chalk of Burham, Kent. Figured by Owen in his 'Cretaceous Reptilia' (Mon. Pal. Soc.), pt. i. pl. vi. fig. 3, as *Chelone camperi* (?). *Purchased*, 1878.

**49010.** (*Fig.*) Mass of rock containing a number of marginals in apposition and the extremities of two costals; from Burham, Kent. Figured by Owen, *op. cit.* pl. vi. figs. 1, 2, as *Chelone cam-*

*peri* (?); and also in Dixon's 'Geology of Sussex,' pl. xxxix. figs. 5, 6. The marginals are of the short type characteristic of *C. benstedi*. *Purchased*, 1878.

**49922.** Fragment of chalk showing the inner surfaces of a small imperfect costal and of another dermal bone; from Lewes. *Capron Collection.*

**R. 1492.** Fragment of chalk showing the inner surface of an imperfect costal; locality unknown. *No history.*

**R. 1493.** Fragment of chalk showing the inner aspect of a small nuchal bone; locality unknown. *No history.*

**25923 x.** An imperfect dorsal vertebra, in matrix; from Sussex. *Dixon Collection. Purchased*, 1851.

**49921.** The centrum of a smaller dorsal vertebra; from Sussex. *Capron Collection.*

**18404.** The glenoidal region of a scapulo-precoracoid, in matrix; from Arundel, Sussex. *Presented by E. Charlesworth, Esq.*, 1843.

**R. 1495.** A small imperfect left scapulo-precoracoid, in matrix; from Kent. *No history.*

**R. 1495 a.** A nearly entire left scapulo-precoracoid; from Kent. *No history.*

**49009.** (*Fig.*) The proximal portion of a right coracoid, in matrix, belonging to a turtle of considerable size; from Kent. Figured by Owen, *op. cit.* pl. vii. A. figs. 4, 5. *Purchased*, 1878.

**R. 1345.** Four bones, in matrix, which appear to belong to the manus of a large individual of the present family; from Burham, Kent. *Harford Collection. Purchased*, 1888.

**36254.** (*Fig.*) A small right femur, wanting part of the shaft; from Rochester, Kent. Figured by Bensted in the 'Geologist,' vol. v. p. 296, fig. 2, and referred to *Trionyx*. *Mantell Collection. Purchased*, 1853.

B. *From the Cambridge Greensand.*

**35177.** Several associated fragments of the carapace of a rather small turtle, comprising marginals and portions of costals; the marginals are elongated. *Purchased*, 1859.

**35198.** Two neural bones. *Purchased*, 1859.

**35187.** Two marginals of the same type as those of No. 35177. *Purchased*, 1859.

**35187 a.** An imperfect marginal, in two fragments. *Purchased*, 1859.

**35208.** A pygal bone. The posterior border is emarginate, as in *Thalassochelys*. *Purchased*, 1859.

**35209.** A smaller pygal, with the posterior border entire. *Purchased*, 1859.

**35331.** The centrum of a large posterior cervical vertebra. This specimen is rather smaller than the one (No. 35385) mentioned on p. 37, but may belong to the same form. *Purchased*, 1859.

**41785.** An imperfect caudal vertebra. *Purchased*, 1869.

**35177.** The glenoidal portion of a small right scapulo-precoracoid. *Purchased*, 1859.

**35177 a.** A smaller and more imperfect specimen of the same bone. *Purchased*, 1859.

**35316.** The proximal extremity of a small right femur. *Purchased*, 1859.

**35316 a.** A nearly similar specimen of the opposite side. *Purchased*, 1859.

**39109.** The proximal extremity of a nearly identical femur of the right side. *Bowerbank Collection. Purchased*, 1865.

C. *From the Gault of Folkestone.*

**R. 19.** Slab showing the ventral aspect of three imperfect costals of an immature turtle. *Gardner Collection. Purchased*, 1876.

**47210.** Slab showing a marginal, portions of two costals, and an imperfect vertebra of a much larger turtle. *Gardner Collection.*

**47210 a.** An associated slab, containing portions of costals and the centra of two dorsal vertebræ. The vertebræ are unusually short. *Gardner Collection.*

**R. 20.** Slab showing fragments of a comparatively large plastron. *Gardner Collection.*

**R. 28.** Slab with fragment of a large costal. *Gardner Collection.*

**R. 22.** Slab showing the dorsal aspect of the femur of a medium-sized turtle. *Gardner Collection.*

**R. 23.** Slab showing the dorsal aspect of a smaller femur. *Gardner Collection.*

**47210.** Slab exhibiting the dorsal aspect of a still smaller femur. *Gardner Collection.*

**R. 24.** Slab showing the dorsal surface of an imperfect left scapulo-precoracoid. *Gardner Collection.*

**R. 21.** The centrum of a small dorsal vertebra, in matrix. *Gardner Collection.*

**R. 28.** The centrum of a caudal (?) vertebra, in matrix. *Gardner Collection.*

## Genus **ARGILLOCHELYS,** Lydekker[1].

Skull short and wide, with the orbits and nares directed slightly upwards, a wide interorbital bar, and usually an occipital shield. Palate with low alveolar walls, and a swelling ridge on either side separated by a median groove; pterygoids short, wide anteriorly, deeply emarginate, with prominent ectopterygoid processes at their antero-external angles. Palatal apertures of temporal fossæ as wide as long; posterior nares in anterior half of cranium; vomer long and joining the elongated premaxillæ. Mandibular symphysis of moderate length, convex inferiorly, with the oral surface ridged; length of postsymphysial portion in some cases less than twice that of the symphysis.

Shell and the bones of pectoral girdle and limbs apparently of the general type of those of *Thalassochelys*. The carapace has, however, but four costal shields, and the xiphiplastrals unite extensively in the middle line, while in one case the plastron is much less ossified than in the existing genus. The humerus may also be more constricted than in the latter.

[1] Quart. Journ. Geol. Soc. vol. xlv. p. 236 (1889).

A. *Species founded on the skull.*

### Argillochelys, sp. *a*.

Imperfectly known, but apparently closely allied to the next species, with which it may prove identical. The rami of the mandible are much less divergent than in species *b*.

*Hab.* Europe (England).

**R. 1447.** The nearly entire mandible; from the Middle Eocene of Bracklesham, Sussex. The total length is 0,069 (2·73 inches), and the length of the symphysis 0,023 (0·9 inch). This specimen closely resembles the mandible of the largest skull of *A. antiqua*. *No history.*

**R. 1447 a.** The symphysis of a larger mandible of similar type. The general contour of this specimen is very similar to that of the mandible of *Chelone mydas*, but the position of the ridge is different. *No history.*

### Argillochelys antiqua (König [1]).

Syn. *Chelone antiqua*, König [2].
*Chelone breviceps*, Owen [3] (in parte).
*Puppigerus breviceps*, Cope [4] (in parte).

Skull of moderate width, vaulted, and without a sharp descent of the facial profile in the orbital region. Mandible comparatively narrow. The occipital shield may either completely divide the paroccipitals, when the interparietal shield is short, without a posterior re-entering angle; or may be pushed completely back to the supraoccipital spine, when the interparietal becomes longer and has a posterior re-entering angle.

It is probable that either the shells entered under the head of *A. subcristata* or those mentioned as *A. convexa* are referable to the present form, but there are at present no means of connecting them with the skulls. The shells referred by Owen to the present species are entered below as *Lytoloma planimentum*.

The rugose character of the cranial bones in the type appears to be due to erosion.

*Hab.* Europe (England).

[1] Icones Fossilium Sectiles, pl. xviii. fig. 238 (1825).—*Chelone*.
[2] *Loc. cit.* [3] Rep. Brit. Assoc. for 1841, p. 178 (1842).
[4] Trans. Amer. Phil. Soc. vol. xiv. pt. i. p. 235 (1870).

**49465.** The imperfect skull; from the London Clay (Lower Eocene) of the Isle of Sheppy. The type; figured by König in his 'Icones Foss. Sectiles,' pl. xviii. fig. 232. The borders of the orbits are broken away, and the occipital, nasal, and premaxillary regions are also imperfect. On the palate, so far as can be seen, the characters of the pterygoids and the contour of the apertures of the temporal fossæ are of the general type of those of *A. cuneiceps*. The external surface of the cranial bones is rugose, but this appears to be due to erosion. The boundaries of an occipital shield dividing the paroccipitals and joining the interparietal are distinctly visible. The characters of the mandible are well shown. In the nearly similar specimen in the Museum of the Royal College of Surgeons, figured in Owen's 'History of British Fossil Reptilia,' Chelonia, pl. xvii. A., and also in pl. i. of his 'Reptilia of the London Clay,' as the type of *Chelone breviceps*, no occipital shield is shown; and its absence is made a specific character. In the restored palate figured in pl. xvii. of the former work, it would appear from the present specimen that the anterior expansion of the pterygoids is insufficiently given; and the ectopterygoid processes are not distinct enough. *(Fig.)* *No history.*

**28854.** The imperfect skull of a smaller individual; from Sheppey. The cranial bones have the same rugose character as in the last. The outline of the short and broad interparietal and frontal shields is shown, and there are traces of the occipital shield. *Purchased*, 1854.

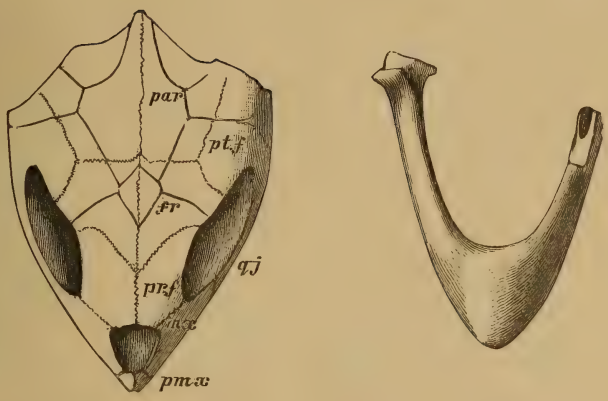
**32386.** The imperfect skull of an individual somewhat smaller than the type; from Sheppey. In this specimen the surface of the cranial bones has not been eroded. The borders of the orbits and nares are broken; but the mandible is nearly entire. The occipital shield, if present, must have been pushed back to the supraoccipital spine, and the paroccipital shields unite in the middle line; while the interparietal is long and narrow with a re-entering posterior angle. *Purchased. About* 1857.

**38955.** A smaller skull; from Sheppey. Figured in the accompanying woodcut. This specimen is imperfect posteriorly, but shows the contour of the greater part of the cranium *(Fig.)*

very well, the premaxillæ being entire. The arrangement of the shields is the same as in the type; but the length of the symphysis (as in No. 32386) is relatively longer.

*Bowerbank Collection. Purchased*, 1865.

Fig. 10.




*Argillochelys antiqua.*—Frontal aspect of the cranium and ventral aspect of the mandible; from the London Clay of Sheppey. ½. *pmx*, premaxilla; *mx*, maxilla; *qj*, quadratojugal; *prf*, prefrontal; *fr*, frontal; *ptf*, postfrontal; *par*, parietal. The sharp lines indicate the boundaries of the epidermal shields, of which the names are given in fig. 11; the occipital shield is confluent with the interparietal.

**37213.** A smaller cranium; from Sheppey. The greater part of the palate is concealed by matrix; but the palatal ridges separated by a median groove are visible, and correspond in general characters with those of *A. cuneiceps*.

*Bowerbank Collection.*

**R. 1364.** A skull agreeing in size with the preceding, and probably belonging to the same species; from the Red Crag of Suffolk, and derived from the London Clay. Most of the outer bones have been removed, leaving a hard cast of the hollows of the skull.

*Harford Collection. Purchased*, 1888.

**R. 1364 a.** A larger skull in a similar condition, probably belonging either to this or the next species; from the Red Crag.

*Harford Collection.*

### Argillochelys, sp. *b*.

Known only by the mandible, which indicates a form closely allied to, if not identical with, the next species. The mandibular symphysis is wider and flatter than in species *a*, and the rami are more divergent.

*Hab.* Europe (England).

**38099.** (*Fig.*) The nearly entire mandible; from the Middle Eocene of Bracklesham, Sussex. Figured by Owen in his 'Reptilia of the London Clay, &c.' vol. i. pt. i. pl. x. D. figs. 1, 2. The specimen is there stated to be from Hordwell, but its mineral condition and its similarity to the next specimen indicate this to be incorrect. The right articular is wanting. *Hastings Collection. Purchased*, 1855.

**26134 x.** A similar mandible, wanting the greater part of the right ramus; from Bracklesham. If applied to the type skull of *A. cuneiceps*, this specimen fits so well that it might almost have belonged to the same individual.
*Dixon Collection. Purchased*, 1851.

**38964.** A neural bone provisionally referred to this form; from Bracklesham. In its extreme elongation this specimen agrees with *Chelone* and differs from *Lytoloma*, whence it is probably referable to the present genus.
*Hastings Collection.*

### Argillochelys cuneiceps (Owen [1]).

Syn. *Chelone cuneiceps*, Owen [2].
*Chelone convexa*, Owen [3] (in parte).

The type species. Skull of adult very wide and much depressed, with a sharp descent of the facial profile in the orbital region; occipital shield thrust back to the posterior extremity of the par-occipitals, which thus meet in the middle line; interparietal shield elongated, with a deep re-entering angle posteriorly. Mandible unknown, but evidently of the same type as in the preceding form.

The remarks made under the head of *A. antiqua* as to the specimens which may probably be the shells of that species will apply equally in the present instance.

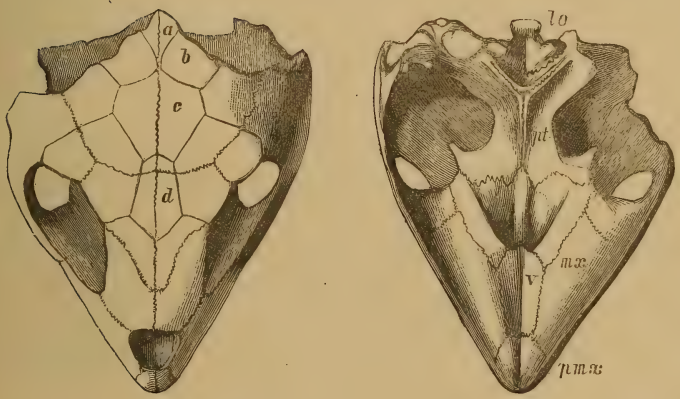
*Hab.* Europe (England).

[1] Reptilia of the London Clay, &c. (Mon. Pal. Soc.), vol. i. pt. i. p. 33 (1849).—*Chelone*. [2] *Loc. cit.*
[3] History of British Fossil Reptilia, Chelonia, pl. xxv. figs. 1–3.

**41636.** The imperfect cranium; from the London Clay (Lower Eocene) of the Isle of Sheppey. The type specimen; figured by Owen in his 'Reptilia of the London Clay, &c.' vol. i. pt. i. pl. xv. The extremity of the beak and the supra-occipital region are wanting; and the right quadrate and inferior temporal arcade are likewise broken away. The contour of the epidermal shields is very clearly displayed. The two paroccipital shields are in contact, so that the azygous paroccipital, if present, must evidently have been thrust back to the extremity of the supraoccipital, as is often found to be the case with *Thalassochelys*. The ectopterygoid processes are beautifully shown. (*Fig.*)

*Toulmin-Smith Collection. Purchased*, 1869.

Fig. 11.




*Argillochelys cuneiceps.*—Frontal and palatal aspects of the cranium of an immature individual; from the London Clay of Sheppey. ½. The palate is partially restored from No. 41636. *pmx*, premaxilla; *mx*, maxilla; *pt*, pterygoid; *ept*, ectopterygoid process of pterygoid; *bo*, basioccipital; *a*, occipital shield; *b*, paroccipital shield; *c*, interparietal shield; *d*, frontal shield. The bones on the frontal aspect correspond with those of fig. 10.

**44092.** An imperfect cranium; from Sheppey. This specimen, although more imperfect, agrees closely with the preceding, such remnants of the boundaries of the epidermal shields as remain showing the same general contour.

*Purchased*, 1863.

**37213 a.** The cranium of a young individual, somewhat imperfect posteriorly; from Sheppey. Figured in woodcut (fig. 11). (*Fig.*)

This specimen agrees closely with the next, and its resemblance to the type is so marked as to leave no reasonable doubt as to its specific identity. In this example the azygous occipital shield extends forwards so as to separate the two paroccipitals for a considerable portion of their length, although they are in contact anteriorly.

*Bowerbank Collection. Purchased*, 1865.

**25610.** (*Fig.*) The somewhat imperfect cranium of a young individual; from Sheppey. Figured by Owen in Dixon's 'Geology of Sussex,' pl. xiii. figs. 1–3, and also in his 'History of British Fossil Reptilia,' Chelonia, pl. xxv. figs. 1–3, as *Chelone convexa*. There is not the slightest evidence for associating this cranium with the carapace on which the latter species was founded. Both in this and the preceding specimen the ridges on the palate are much less prominent than in adult crania. The other specimen figured by Owen under the same name is noticed on page 65.

*Dixon Collection. Purchased*, 1851.

**30525.** An imperfect and somewhat larger immature cranium; from Sheppey. The contour of the epidermal shields is the same as in the two preceding specimens. *Purchased.*

**35696.** An entire cranium agreeing in size with the preceding; from Sheppey. The general contour is well preserved, but the palate can be only partially cleared from matrix, and the boundaries of the epidermal shields are not shown.

*Purchased*, 1859.

**38959.** An imperfect cranium; from Sheppey. This specimen, which is nearly of the same size as the preceding, shows the palate fairly well, but has lost a great part of the frontal aspect. *Bowerbank Collection.*

**R. 1476.** An imperfect cranium, partly concealed by matrix; from Sheppey. The lateral region of the right half of the palate is exposed. *No history.*

### B. *Species founded on shells.*

It is probable that the two undermentioned forms are respectively identical with *A. breviceps* and *A. cuneiceps*, but there is at present no evidence to connect the shells with the skulls.

## Argillochelys subcristata (Owen [1]).

Syn. *Chelone subcristata*, Owen [2].
*Puppigerus subcristatus*, Cope [3].
(?) *Chelone subcarinata*, Bell [4].
(?) *Puppigerus subcarinatus*, Cope [5].

Neural bones of carapace with the antero-lateral facets much shorter than the postero-lateral ones. Carapace depressed, with the neurals elongated, and in some instances carinated posteriorly; and the vertebral shields comparatively narrow. Plastral vacuities large.

It appears most probable that the characters on which *Chelone subcarinata* was separated from the present form are not of more than individual value, and the type of the former is accordingly included under the present specific heading.

*Hab.* Europe (England).

38952. (*Fig.*) The shell, wanting nearly all the marginals, and otherwise imperfect; from the London Clay. The type; figured by Owen in his 'Reptilia of the London Clay, &c.' vol. i. pt. i. pl. viii. The convexity of the middle antero-posterior line of the carapace has been broken down by pressure. The plastron is not well preserved; but the long slender xiphiplastrals are clearly shown, and the contour of the entoplastral can also be distinguished. Some of the bones of the limb-girdles and limbs remain.
*Bowerbank Collection. Purchased*, 1865.

39762. (*Fig.*) The shell, wanting the marginals, but otherwise nearly entire; from the London Clay (Lower Eocene) of the Isle of Sheppey. The type of *C. subcarinata*. Figured by Bell in the 'Reptilia of the London Clay, &c.' vol. i. pt. i. pl. viii. A. The contour of the epi- and entoplastrals is almost exactly the same as in *Thalassochelys*; the xiphiplastrals have been somewhat crushed together by pressure. The humerus of either side is preserved, but in a somewhat imperfect condition, so that the characters of the proximal extremity cannot be determined; the shaft is, however, much constricted. *Bowerbank Collection.*

[1] Rep. Brit. Assoc. for 1841, p. 179 (1842).—*Chelone.* [2] *Loc. cit.*
[3] Trans. Amer. Phil. Soc. vol. xiv. pt. i. p. 235 (1870) (Mon. Pal. Soc.).
[4] Owen & Bell, Reptilia of the London Clay, vol. i. &c. pt. i. p. 37 (1849).
[5] *Loc. cit.*

**R. 910.** A larger shell, apparently belonging to this form; from Sheppey. The marginals are wanting, and the carapace has been flattened by pressure, and is otherwise imperfect. The neurals are not distinctly keeled, but the general contour of these bones, as well as that of the vertebral shields, accords with the preceding specimen. The long xiphiplastrals are shown. *No history.*

**39765.** An imperfect shell probably referable to this species, in which the sides of the carapace have been crushed together by pressure; from Sheppey. The contour of the bones and shields of the carapace seems to be nearly similar to the last specimen. *Bowerbank Collection.*

**37208.** The imperfect shell of a very young individual, probably referable to this species; from Sheppey. In the plastron the characteristic form of the ento- and xiphiplastrals is well displayed. *Bell Collection. Purchased*, 1863.

**38956.** An imperfect young shell of a similar type; from Sheppey. *Bowerbank Collection.*

## **Argillochelys convexa** (Owen [1]).

Syn. *Chelone convexa*, Owen [2].
*Puppigerus convexus*, Cope [3].
? *Chelone declivis*, Owen [4].

Distinguished from the preceding species by the more vaulted carapace, in which the middle and hinder neurals are relatively shorter and wider, and generally without a distinct keel, while the vertebral shields are often wider. In the plastron the ossification is still more imperfect.

As suggested by Owen, it is probable that the characters on which *Chelone declivis* was separated are merely due to difference of age. The skulls referred by Owen to the present species are noticed under the heads of *A. cuneiceps* and *Lytoloma planimentum*.

*Hab.* Europe (England).

**39764.** An imperfect shell, provisionally referred to this form; from the London Clay (Lower Eocene) of the Isle of Sheppey. This specimen, in which three of the middle

[1] Rep. Brit. Assoc. for 1841, p. 178 (1842).—*Chelone.* [2] *Loc. cit.*
[3] Trans. Amer. Phil. Soc. vol. xiv. pt. i. p. 235 (1870).
[4] Reptilia of the London Clay, &c. vol. i. pt. i. p. 30 (1849).

neurals are wanting, agrees in general shape and in the contour of the wide vertebral shields with the type shell figured by Owen in his 'Reptilia of the London Clay, &c.' pl. vii. *Bowerbank Collection. Purchased*, 1865.

**37718.** A smaller and more imperfect shell of the same general type. The wide vertebral shields are well shown, and the condition of the neuro-costal sutures both in this and the preceding specimen is indicative of immaturity.
*Bell Collection. Purchased*, 1863.

**26134 a.** (*Fig.*) The imperfect carapace, with the right costals crushed downwards and inwards so as to conceal the plastron; from the London Clay of Bognor, Sussex. The type of *Chelone declivis*. Figured by Owen, *op. cit.* pl. xiv., and also in Dixon's 'Geology of Sussex,' p. 229, woodcut. The narrower vertebral shields of this specimen are probably due to its greater age.
*Dixon Collection. Purchased*, 1851.

**28767.** A nodule showing the dorsal aspect of the imperfect carapace of a young individual; from Sheppey.
*Bowerbank Collection.*

**35717.** An imperfect carapace agreeing closely with No. 37718. This specimen has been somewhat flattened by pressure.
*Purchased*, 1860.

## Genus **THALASSOCHELYS**, Fitzinger [1].

Skull broader and shorter than in *Chelone*, with the orbits nearly vertical, the nares directed somewhat upwards, a very wide inter-orbital bar, and an occipital shield. Palate short, with thick low alveolar walls and typically no ridge [2]; pterygoids of moderate length, slightly emarginate, with the ectopterygoid processes a short distance above their antero-external angles. Palatal apertures of temporal fossæ longer than wide; posterior nares in anterior half of cranium; vomer short and usually not reaching the premaxillæ. Mandibular symphysis comparatively long, convex inferiorly and concave superiorly, and typically without an oral ridge [2]. Shell cordiform, with five costal shields, and the vacuities more or less

[1] Ann. Mus. Wien, vol. i. p. 121 (1835).

[2] *T. kempi* is described as having oral ridges; see Boulenger, 'Catalogue of Chelonians, &c.' p. 186.

nearly obliterated in the adult[1]; epiplastrals narrower than in *Chelone*; entoplastral shorter and T-shaped; and the xiphiplastrals still narrow, but uniting rather more fully. Coracoid shorter and stouter, with a greater distal expansion than in *Chelone*. Humerus with the head placed rather more obliquely to the shaft, the latter more constricted, and the radial process nearer to the head than in the type genus.

The skull is larger in proportion to the shell than in *Chelone*. The position of the posterior nares tends to become more backward and the relative length of the mandibular symphysis to increase with age. In old individuals the length of the postsymphysial portion of the mandible is only slightly longer than that of the symphysis itself.

### **Thalassochelys eocænica,** Lydekker[2].

Known only by the humerus; attains dimensions equal to *T. caretta*.

*Hab.* Europe (England).

**R. 1557.** Cast of the imperfect left humerus. The original was obtained from the Middle Eocene of Bracklesham, Sussex; and is in the collection of J. B. Ogle, Esq. It is the type of the species, and is described and figured by the writer in the 'Proc. Geol. Assoc.' vol. xi. p. 177, fig. 1. The distal extremity is wanting, and the head has been considerably eroded. The strongly marked constriction of the shaft affords the ground of the generic reference.

*Made in the Museum*, 1889.

### **Thalassochelys,** sp.

Very imperfectly known; fully as large as *T. caretta*, from which it is distinguished by the form of the mandibular symphysis. Perhaps specifically identical with *T. eocænica*.

*Hab.* Europe (England).

**38995.** The left half of the mandibular symphysis; from the London Clay (Lower Eocene) of the Isle of Sheppey. Noticed by the writer in the 'Proc. Geol. Assoc.' vol. xi. p. 177. The edge of the alveolar border is worn away. This large specimen comes much nearer to the mandible

[1] The costals may completely unite with the marginals.

[2] Proc. Geol. Assoc. vol. xi. p. 177 (1889).

of the Loggerhead than to that of the Hawksbill and apparently indicates an allied form, which may be at least provisionally included in the same genus. The foramina on the oral surface and also the two large ones on the anterior border of the masseteric fossa of the ramus agree closely with the existing species. On the inferior aspect of the ramus there is, however, a prominence below the masseteric fossa, which does not occur in the existing form, and affords a good specific character.

*Bowerbank Collection. Purchased*, 1865.

**43263.** A large imperfect left scapulo-precoracoid provisionally referred to this form; from Sheppey. Nearly the whole of the precoracoid is wanting. The specimen is somewhat larger than the scapula of the largest recent skeleton of *Chelone mydas* in the Museum. Judging from the relatively small size of the coracoid and carapace in *Lytoloma crassicostatum* and *L. planimentum*, this specimen would be much too large to have belonged to either of these species, and it is quite different from the corresponding bone of the *Dermochelyidæ*.

*Presented by Dr. Kowalevsky*, 1871.

## Genus **LYTOLOMA**, Cope [1].

Syn. *Euclastes*, Cope [2].
*Glossochelys*, Seeley [4].
*Erquelinnesia*, Dollo [6].
? *Propleura*, Cope [8].
*Puppigerus*, Cope [3] (*in parte*).
*Pachyrhynchus*, Dollo [5].
? *Osteopygis*, Cope [7].

Skull of the general proportions of that of *Thalassochelys*, with the orbits and nares largely directed upwards, a narrow interorbital bar, and an occipital shield. Palate flat, with very low alveolar walls and no ridge; pterygoids short, deeply emarginate, and in the adult joined near the middle of the emargination by the boundary of the posterior nares; the ectopterygoid processes near their anterior extremities. Palatal apertures of temporal fossæ very wide; posterior

[1] Trans. Amer. Phil. Soc. vol. xiv. pt. i. p. 144 (1870).
[2] Proc. Ac. Nat. Sci. Philad. 1867, p. 39. Preoccupied by the Coleopterous genus *Euclastes*, Led. (1855).
[3] Trans. Amer. Phil. Soc. *op. cit.* p. 235.
[4] Ann. Mag. Nat. Hist. ser. 4, vol. viii. p. 227 (1871).
[5] Bull. Mus. R. Hist. Nat. Belg. vol. iv. p. 130 (1886).—Preoccupied.
[6] Geol. Mag. dec. iii. vol. iv. p. 393 (1887).—To replace the preceding name.
[7] Proc. Ac. Nat. Sci. Philad. 1868, p. 147.
[8] Trans. Amer. Phil. Soc. *op. cit.* p. 138.

nares in hinder half of cranium, and in the adult of the larger species situated very far back; vomer as in *Argillochelys*. Mandible (figs. 8, 9) with very deep masseteric fossa, and long, depressed, and wide symphysis, which in the adult of the larger forms is much flattened both above and below. Carapace rounded posteriorly; vacuities of shell still more obliterated than in *Thalassochelys*; epiplastrals narrow; exposed portion of entoplastral very short; xiphiplastrals uniting extensively in the middle line, and often of great relative width.

Coracoid of the adult short and much expanded distally; but longer and more slender in the young. Humerus (fig. 6) of the type of *Thalassochelys*, but the head often placed still more obliquely to the long axis, the shaft more constricted, the ulnar process rising only a short distance above the head, and the radial process connected more or less with the head. Terminal phalangeals not flattened, and clawed. Neural bones of carapace comparatively short.

The synonymy has been discussed by the present writer[1], who has shown that the name *Euclastes*, which Dollo[2] proposes to adopt in lieu of *Erquelinnesia*, is preoccupied. *Lytoloma*, which Dollo first identified with the latter, is adopted as being the second earliest of the terms based on the evidence of the skull. *Osteopygis*, which is of earlier date, was applied to a shell, which may be generically the same. The genus *Puppigerus* was founded on the "Eocene marine turtles of the London Clay, and a Miocene species of North America"; and since the so-called *Chelone longiceps* is the first mentioned of the English forms there can be no hesitation in taking that species as the type. The young of *L. crassicostatum* shows that *Puppigerus*, as thus typified, must be regarded as a synonym of the present genus.

The skull in the larger forms bears a still greater size relatively to that of the shell and limb-bones than in *Thalassochelys*. In the adult, at least of the larger forms, the posterior nares become more and more backward as age advances; this development being accompanied by an increase in the length of the mandibular symphysis, which at the same time becomes more and more flattened. The upward direction of the orbits and the narrowness of the interorbital bar also increases with age.

The variation in the number of costal bones, on the evidence of which the family *Propleuridæ* (in which the present and allied types

[1] Quart. Journ. Geo Soc. vol. xlv. p. 233 (1888). See also Proc. Zool. Soc. 1889, p. 62.

[2] Geol. Mag. dec. iii. vol. v. pp. 261–267 (1888); and Ann. Soc. Géol. Nord, vol. xv. pp. 114–122 (1888).

have been included) was originally proposed, cannot be regarded as of even generic value, since similar variations occur in *Trionyx* [1]. Again, the difference in the contour of the humerus of the adult of the larger species from that of *Chelone*, on which Dollo in his later memoirs mainly relies in his retention of the *Propleuridæ*, cannot be regarded as more than a generic character, since there is an extremely close connection between this type of humerus and that of *Thalassochelys*; some of the species included in the present genus having, indeed, the head of this bone placed even less obliquely than in the existing genus. The alleged separation of the nasals from the prefrontals is noticed below.

Finally, seeing that the existing *Thalassochelys caretta* has an almost cosmopolitan range, it has yet to be proved that the N.-American forms described as *Euclastes* and *Lytoloma* are even specifically distinct from the European ones.

### Lytoloma trigoniceps (Owen [2]).

Syn. *Chelone trigoniceps*, Owen [3].
*Chelone acuticeps*, Owen [4].
*Pachyrhynchus trigoniceps*, Dollo [5].

Apparently allied to *L. longiceps*, from which it is distinguished by the wider and more concave interorbital space, the longer and more depressed orbits, in which the frontal border is entire, the less emarginate pterygoids, and the narrower inferior apertures of the temporal fossæ. In both species the interparietal shield is long and narrowed in front. In the present species the inferior aspect of the mandibular symphysis may be somewhat convex, with an indistinct longitudinal keel, but in other cases it is nearly flat. The neurals of the carapace are similar to those of *L. longiceps*. This species attains larger dimensions than any examples of the latter species.

In some of the foregoing characters this species approximates to *Thalassochelys*, and thus tends to connect the larger Lower Eocene species with that genus. If any of the following specimens are adult, the species must have been of comparatively small size.

The variations in the degree of flattening of the mandibular symphysis are probably sexual.

*Hab.* Europe (England).

[1] See Boulenger, 'Catalogue of Chelonians, &c.' pp. 244–245.

[2] In Dixon's 'Geology of Sussex,' 1st ed. p. 218 (1850).—*Chelone.* Also mentioned in 'Fossil Reptilia of London Clay' (Mon. Pal. Soc.), vol. i. pt. i. p. 31 (1849), without figure.

[3] *Loc. cit.*

[4] History of British Fossil Reptilia, Chelonia, pl. xxv. (1849).

[5] Bull. Mus. R. Hist. Nat. Belg. vol. iv. p. 138 (1886).

**39771.** The imperfect cranium ; from the Middle Eocene of Bracklesham, Sussex. This specimen agrees precisely in size and characters with the more imperfect type cranium, from the same beds, figured by Owen in Dixon's ' Geology of Sussex,' pl. xiii. fig. 4, and also in his ' History of British Fossil Reptilia,' Chelonia, pl. xxv. fig. 4, from the palatal aspect. The present specimen, which has been somewhat crushed and has lost the extremity of the beak, shows both the frontal and oral aspects. On the former the occipital shield is distinctly seen. The palate agrees with that of the next species in its width and flatness, the absence of distinct ridges, the very low, sloping alveolar walls, and the position of the posterior nares. The basioccipital is absent, and the two pterygoids have been separated in the middle line. The latter bones appear to be less emarginate laterally than in the next species; and in this respect, as well in the more elongated inferior apertures of the temporal fossæ, the species approximates to *Thalassochelys*. *Morris Collection. Purchased*, 1867.

**33233.** The parieto-frontal region of a larger cranium not improbably belonging to this species ; from Bracklesham. The boundaries of the epidermal shields are not visible.
*Hastings Collection. Purchased*, 1855.

**25599.** (*Fig.*) The right quadrate with part of the palatal region of the pterygoid attached, and the stapes *in situ* ; from Bracklesham. Figured by Owen in his ' Reptilia of the London Clay, &c.' vol. i. pt. ii. pl. xxix. figs. 3, 4, without specific name. This specimen agrees essentially with the corresponding part of the skull of the existing *Thalassochelys*, and differs from that of *Chelone*, as is shown especially by the long channel for the stapes, the prominent process immediately above, and the small vertical height of the articular portion. *Dixon Collection. Purchased*, 1851.

**R. 1025.** The mandible, imperfect posteriorly ; from Bracklesham. From its correspondence in character with the cranium there can be no doubt that this specimen is referable to the present species. The symphysis is much flattened, but has an indistinct ridge inferiorly. The left side wants only the articular and splenial.
*Presented by P. E. Combe, Esq.*, 1888.

**26130.** The slightly imperfect symphysis, and part of the right (*Fig.*) ramus of a similar but smaller mandible; from Bracklesham. Figured by Owen in Dixon's 'Geology of Sussex,' pl. xiii. figs. 5–7, and also in his 'History of British Fossil Reptilia,' Chelonia, pl. xxv. figs. 5–7, where it is referred to the present species. *Dixon Collection.*

**R. 1491.** Cast of the entire mandible. The original was obtained from Bracklesham, and is preserved in the Museum of Practical Geology, Jermyn Street. It differs from the two preceding specimens by the inferior surface of the symphysis being less flattened, but this can scarcely be regarded as more than a sexual difference.
*Made in the Museum*, 1889.

**R. 1025 a.** A mandibular symphysis of nearly similar type; from Bracklesham. This specimen is slightly narrower than the last. *Presented by P. E. Combe, Esq.*, 1888.

**26132.** The imperfect symphysis of a similar mandible; from the (*Fig.*) Middle Eocene of Bracklesham, Sussex. One of the types of *Chelone acuticeps*[1]; figured by Owen in Dixon's 'Geology of Sussex,' pl. xiii. fig. 18, and also in his 'History of British Fossil Reptilia,' Chelonia, pl. xxv. fig. 18.
*Dixon Collection. Purchased*, 1851.

**26131.** Part of a larger mandibular symphysis of the same general (*Fig.*) type as the preceding; from Bracklesham. Figured by Owen, *op. cit.* figs. 8, 10, as *Chelone acuticeps.*
*Dixon Collection.*

**26133.** An imperfect mandibular symphysis probably referable to (*Fig.*) this form; from Bracklesham. Figured by Owen, *op. cit.* fig. 9, as *Chelone longiceps.* *Dixon Collection.*

**28087.** Three specimens of the imperfect symphyses of mandibles of the same general type as the preceding; probably from Bracklesham. *Presented by F. E. Edwards, Esq.*, 1852.

**26134.** Four portions of mandibular symphyses of the same general type; from Bracklesham. *Dixon Collection.*

**R. 1480.** Mass of clay showing the dorsal aspect of a sacrum and first caudal vertebra, probably referable to this species; from Bracklesham. *Hastings Collection.*

[1] This name would appear to be due to an error, since in the text all the specimens are referred to *Chelone longiceps.*

**33198.** A right humerus, imperfect proximally; from Bracklesham. This specimen is provisionally referred to this species on account of the marked constriction of the shaft. It closely resembles the smaller humerus of *L. cantabrigiense*, No. 35175 (p. 69). *Hastings Collection.*

**33238 a.** A neural bone probably referable to this species; from Bracklesham. This specimen would agree in relative size with the cranium No. 33233. *Hastings Collection.*

**R. 1586.** A neural, imperfect posteriorly; from Bracklesham. This specimen is flatter than the preceding. *No history.*

**33198.** Portions of four costal bones agreeing in relative size with the preceding specimens; from Bracklesham. These specimens comprise the inner extremities of the 2nd and 4th costals of the right, the 2nd or 4th costal of the left side, of which the inner extremity is wanting, and one which is probably the 3rd of the right side, the inner extremity being wanting. *Hastings Collection.*

*Most or all of the following bones of the pectoral girdle and limbs are probably referable to this species.*

**33200.** The glenoidal extremity of the left scapulo-precoracoid of a large individual; from Bracklesham. *Hastings Collection.*

**33238 b.** The imperfect glenoidal portion of a smaller scapulo-precoracoid; from Bracklesham. *Hastings Collection.*

**33236.** The proximal half of the left humerus; from Bracklesham. This specimen closely resembles the one represented in fig. 6. *Hastings Collection.*

**33198 a.** The proximal extremity of a smaller left humerus; from Bracklesham. The radial process has the same contour as in *L. cantabrigiense* (p. 69). *Hastings Collection.*

**33238 c.** The left femur of a small individual; from Bracklesham. *Hastings Collection.*

## Lytoloma longiceps (Owen [1]).

Syn. *Chelone longiceps*, Owen [2].
*Puppigerus longiceps*, Cope [3].
*Pachyrhynchus longiceps*, Dollo [4].

The type of *Puppigerus*; apparently of small size.

Skull depressed and much pointed anteriorly, with a long interval between the heart-shaped nares and the subcircular orbits, in which the frontal border is notched, and a moderately wide and nearly flat interorbital bar. Pterygoids very deeply emarginate laterally. Both the occipital and interparietal shields long and narrowed anteriorly. Mandible unknown. Carapace broad and depressed, with the antero-lateral surfaces of the neural bones much shorter than the posterior. Vertebral shields in adult of moderate width, which is approximately equal to the length.

The type skull is figured by Owen in his 'Reptilia of the London Clay, &c.' vol. i. pt. i. pl. iii., and indicates a half-grown individual, the posterior nares being situated on the line of the anterior border of the temporal fossæ.

*Hab.* Europe (England).

*All the undermentioned specimens indicate immature individuals.*

**38950.** (*Fig.*) The imperfect shell, with the occipital region of the skull *in situ*; from Sheppey. The carapace is figured by Owen in his 'Reptilia of the London Clay, &c.' pl. v. fig. 1. The posterior neurals are relatively short. With the exception of its anterior extremity the plastron is nearly entire. The basioccipital and pterygoidal region of the cranium agrees precisely with that of the type skull. Some of the bones of the pelvic girdle and limbs are seen in the inguinal region. *Bowerbank Collection. Purchased*, 1865.

**38951.** (*Fig.*) A larger shell, wanting the marginals; from Sheppey. Figured by Owen, *op. cit.* pl. v. fig. 2, from the plastral aspect. The hinder neurals are longer and narrower than in the preceding specimen; the whole of the bones of the plastron are shown. *Bowerbank Collection.*

**25608.** (*Fig.*) A smaller shell, wanting the marginals, and some of the costals imperfect; from Sheppey. Figured by Owen in his 'History of British Fossil Reptilia,' Chelonia, pl. v.

[1] Rep. Brit. Assoc. for 1841, p. 177 (1842).—*Chelone.* [2] *Loc. cit.*
[3] Trans. Amer. Phil. Soc. vol. xiv. pt. i. p. 235 (1870).
[4] Bull. Mus. R. Hist. Nat. Belg. vol. iv. p. 138 (1886).

The posterior neurals are short, and the plastron is very perfectly preserved. The distal extremity of the right coracoid occupies the plastral vacuity; and other portions of the pectoral and pelvic girdles are also exposed.

*Dixon Collection. Purchased*, 1851.

37212. (*Fig.*) The imperfect shell of a young individual; from Sheppey. Figured in Parkinson's 'Organic Remains,' vol. iii. pl. xviii. fig. 2, and also in Cuvier's 'Ossemens Fossiles,' 3rd ed. pl. ccxliii. fig. 3, as *Emyde de l'isle de Sheppey*. On page 33 of Gray's 'Synopsis Reptilium' (1831), this specimen is made one of the types of *Emys parkinsoni* (see p. 65). The vertebral shields are relatively wider than in the preceding, although less wide than in the smaller shell on which *Chelone latiscutata* was founded.

*Bell Collection. Purchased*, 1863.

35721. A somewhat imperfect adult shell, with the posterior half of the cranium attached; from Sheppey. There is a slight difference in the basioccipital region of the cranium from the young cranium No. 38954 of *L. crassicostatum*. The plastron is well preserved; the 8th neural is absent.

*Purchased*, 1860.

39763. An imperfect adult shell; from Sheppey. The plastron is fairly well preserved. As in the preceding specimens portions of the bones of the girdles and limbs are visible.

*Bowerbank Collection.*

33196. A rather small shell, in a somewhat imperfect condition; from Sheppey. With the exception of a small median vacuity, the plastron is completely ossified. On the left side the proximal portion of the scapulo-precoracoid, portions of the pelvis, and some imperfect vertebræ are preserved. *Purchased. About* 1855.

45902. A smaller imperfect shell, with the hinder portion of the skull *in situ*; from Sheppey. The parietal aspect of the skull accords with *L. crassicostatum* No. 38954. The plastron is well preserved and much ossified.

*Purchased*, 1874.

37211. An imperfect and flattened shell, agreeing closely with the preceding, but with somewhat wider vertebral shields; from Sheppey. *Bowerbank Collection.*

**35689.** A more imperfect shell of the same type; from Sheppey. The plastron shows only the hyo- and hypoplastrals. Part of the left scapulo-precoracoid is visible.

*Purchased*, 1859.

**30526.** Part of a shell, the anterior and posterior regions being wanting; from Sheppey. *Purchased. About* 1856.

**30527.** Portion of a shell, and other bones; from Sheppey. The posterior portion of the carapace and the greater part of the hypoplastrals remain. The carapace agrees precisely with the specimen figured by Owen in his 'Reptilia of the London Clay, &c.' pl. iv. fig. 2. Part of the right scapulo-precoracoid, the two coracoids, and the proximal part of the right humerus are preserved. The humerus agrees generally with that of *Thalassochelys*, but its lateral process was apparently of the type of that of *L. cantabrigiense*. *Purchased. About* 1856.

**25609.** An imperfect shell, with several of the internal bones; from Sheppey. The proximal portion of the left coracoid is shown, and exhibits its characteristic elongated form.

*Dixon Collection.*

**44091.** An imperfect shell apparently belonging to this species; from Sheppey. The carapace is fairly preserved, and exhibits the narrowed vertebral shields. The specimen is larger than any of the preceding. The plastron is very imperfect and has been crushed inwards.

*Purchased*, 1873.

**42130.** An imperfect carapace not improbably belonging to this species; from Sheppey. Some of the marginals are preserved on the right side. *Purchased*, 1870.

**38972.** The proximal extremity of a left humerus perhaps referable to this species; from Sheppey. *Bowerbank Collection.*

## Lytoloma crassicostatum (Owen[1]).

Syn. (?) *Testudo plana*, König[2].
*Chelone crassicostata*, Owen[3].
*Thalassochelys crassicostatus*, Cope[4].
*Puppigerus crassicostatus*, Cope[5].
(?) *Chelone latiscutata*, Owen[6].
(?) *Puppigerus latiscutatus*, Cope[7].
*Pachyrhynchus gosseleti*, Dollo[8].
*Erquelinnesia gosseleti*, Dollo[9].
*Euclastes gosseleti*, Dollo[10].

Skull depressed, long, and pointed anteriorly, with only a short interval between the orbits and the nares, and a gentle descent of the facial profile between the orbits. Mandibular symphysis of adult quite flat inferiorly. Shell with the neurals very short, and their antero-lateral surfaces much shorter than the postero-lateral; and the ribs very wide and thick, and occupying the greater portion of the inferior aspect of the narrow costals of the carapace. Vertebral shields comparatively wide. Coracoid[11] gradually expanding from the proximal to the distal extremity; humerus with the head very oblique to the shaft (fig. 6).

This species was founded on the carapace No. R. 912, and it is almost certain that *Chelone latiscutata* is specifically identical, in which event that name should be adopted, since the type of *Testudo plana* seems insufficient for certain specific determination. The type mandible of the so-called *Euclastes gosseleti* (fig. 8)[12] agrees almost precisely with that of No. 37205, and since other specimens in the Brussels Museum which doubtless belong to the same form show that the cranium is identical in contour with No. 37205, while the carapace is of the same type as the undermentioned specimens, there appears no reasonable doubt that the Belgian form is specifically the same as the English one. The Belgian specimens are

[1] Reptilia of the London Clay &c. vol. i. pt. i. p. 27 (1849).—*Chelone* (Mon. Pal. Soc.).
[2] Icones Foss. Sectiles, pl. xvi. fig. 192 (1825).
[3] *Loc. cit.*
[4] Trans. Amer. Phil. Soc. vol. xiv. pt. i. p. 146 (1870).
[5] *Ibid.* p. 235.
[6] Rep. Brit. Assoc. for 1841, p. 179 (1842).
[7] *Loc. cit.* p. 235.
[8] Bull. Mus. R. Hist. Nat. Belg. vol. iv. p. 138 (1886).
[9] Geol. Mag. dec. iii. vol. iv. p. 393 (1887).
[10] Ann. Soc. Géol. Nord, vol. xv. p. 115 (1888).
[11] See Owen, 'Reptilia of the London Clay, &c.' vol. i. pt. i. pl. xiii.
[12] The writer has had the advantage of making an actual comparison with the Belgian specimens.

important as showing the variation which occurs in the contour of the mandible of different individuals.

This species attains large dimensions, but the skull is considerably larger in proportion to the shell and limb-bones than in existing *Chelonidæ*. The undermentioned specimens exhibit the alteration in the characters of the skull with age; and also prove the correctness of Owen's association of the skull with the shell.

*Hab.* Europe (England and Belgium).

**37205.** (*Fig.*) The nearly entire adult skull; from the London Clay (Lower Eocene) of Harwich, Essex. Noticed by Owen in the Rep. Brit. Assoc. for 1841, p. 178, as *Chelone planimentum*; and described and figured by him in his 'Reptilia of the London Clay, &c.' vol. i. pt. i. pl. xi., as *C. crassicostata*, at which date the palatal and occipital regions were concealed by matrix. Noticed by Seeley in the 'Ann. Mag. Nat. Hist.' ser. 4, vol. viii. p. 232, where it is considered to be inseparable from the next species. Described and figured by the present writer in the 'Proc. Zool. Soc.' 1889, p. 60, pls. vi. & vii. The bones of the frontal aspect are mostly wanting, and there is no justification for the separation of the nasals from the prefrontals, as represented in Owen's figure. The bones of the occipital region and the posterior portion of the palate are entire. The depth of the masseteric fossa of the mandible, noticed in Cope's description of the type species, is very clearly shown.

*Bell Collection. Purchased*, 1863.

**37205 a.** (*Fig.*) Part of the shaft of the right humerus, associated with the preceding. Figured by Owen (*op. cit.* pl. xi. fig. 1) in connection with the skull, to which it was originally attached; and also by the present writer, *op. cit.* pl. vii. fig. 2. In the extreme constriction of the middle of the shaft and its sharp postaxial border this specimen agrees with the humerus of the Belgian example figured by Dollo in the 'Geol. Mag.' dec. iii. vol. v. p. 266, fig. 2, and reproduced in fig. 6. It is of small size in comparison with the skull. *Same history.*

**R. 918.** Nodule containing the imperfect skull and shell of a half-grown individual; from Harwich. The skull is intermediate in point of size between the preceding and following specimens, and shows the frontal aspect nearly entire; it agrees precisely in characters with No. 37205. The

carapace is represented by the anterior neurals, many of the left costals, some of the marginals, and a cast of the inner aspect of much of the other portions. In the thick ribs and narrow costals, as well as in the contour of the neurals, it agrees with the type specimen (*infrà*). The vacuities between the costals and marginals are reduced to even a smaller size than in specimens of *Thalassochelys* of the same size. Noticed by the writer, *op. cit.* p. 65.

*No history.*

38954. The imperfect cranium of a young individual; from the London Clay of the Isle of Sheppey. This specimen, which, as noticed by the writer, *op. cit.* p. 66, lacks the extremity of the muzzle and part of the parieto-occipital region, is indistinguishable in contour from the cranium of the preceding specimen. It also resembles in many respects the type cranium of *L. longiceps*, having the same arrangement of the shields; but it differs in the wider inferior apertures of the temporal fossæ, and in the much shorter interval between the orbits and nares. The relatively large size of the orbits indicates immaturity. The posterior nares, instead of being placed close to the occiput, as in the adult skull, are situated slightly in advance of the anterior border of the temporal fossæ. It would, however, merely require the backward growth of the vomer and palatines to produce the same condition as obtains in the adult. There are analogous changes in the position of the posterior nares in *Thalassochelys caretta*, according to the age of the individuals.

*Bowerbank Collection. Purchased,* 1865.

R. 1475. A more imperfect cranium agreeing in size with the preceding specimen; from Sheppey. The posterior part of the palate is well shown; the posterior nares are somewhat further back than in the preceding specimen.

*No history.*

R. 912. (*Fig.*) Two portions of a split nodule showing the imperfect inner surface of the carapace of a half-grown individual, and the counterpart of the same; from Harwich. The type specimen. Figured by Owen in his 'Reptilia of the London Clay, &c.' vol. i. pt. i. pl. xii. The impressions of the anterior neural bones are distinct. *No history.*

**36199.** A split nodule showing the under surface of the imperfect carapace of a smaller immature individual, and a cast of the same; from Harwich. Noticed by Owen, *op. cit.* p. 29. One hyoplastral is shown. *Bell Collection.*

**37719.** A split nodule exhibiting the inner surface of a small imperfect carapace and a cast of the same; from Harwich. *Saul Collection. Purchased,* 1863.

**R. 1481.** The imperfect shell of a young individual apparently belonging to this species; from the London Clay of Sheppey. This specimen agrees precisely with the larger carapace of No. R. 918 in respect to the neural bones; it has the vertebral shields considerably wider than in individuals of *L. longiceps* of the same dimensions, and is in all probability identical with the *Chelone latiscutata* of Owen. The imperfect ossification of the plastron is indicative of immaturity. This specimen is evidently specifically the same as the following. *No history.*

**28853.** A smaller imperfect young shell; from Sheppey. The carapace is very imperfect, but shows the wide vertebral shields characteristic of the preceding specimen. The impression of the ribs shows the stoutness of these bones; there is a minute ninth costal. The general characters of the carapace are very similar to those of No. R. 912. The plastron is nearly entire, but is very imperfectly ossified. The form of the xiphiplastrals is nearly the same as in the larger specimen figured by Owen, *op. cit.* pl. xiii. Several limb-bones are preserved, among which are the right humerus, a femur, and a terminal phalangeal. The latter is curved and rounded. *Purchased,* 1854.

**49466.** (*Fig.*) Fragment of the carapace of a young Chelonian referred by Owen to the present species. Figured by König in his 'Icones Foss. Sectiles,' pl. xvi. fig. 192, as *Testudo plana*, of which it is the type. Noticed by Owen in his 'Reptilia of the London Clay, &c.' pt. i. p. 29. Only the inner surface is displayed, and the specimen appears to be insufficient for specific determination. *No history.*

**1603.** (*Fig.*) Slab exhibiting one lateral aspect of a nearly entire right femur probably referable either to this or the following species; from the London Clay of Harwich. Figured by

Owen in his 'Wealden and Purbeck Reptilia' (Mon. Pal. Soc.), pl. viii. fig. 2, under the name of *Chelone costata*; the specimen being erroneously regarded as coming from the Wealden, and stated to belong to the Mantell Collection. *Presented by E. Charlesworth, Esq.*, 1836.

## **Lytoloma planimentum** (Owen [1]).

Syn. (?) *Chelone harvicensis*, S. Woodward [2].
*Emys parkinsoni*, Gray [3].
*Chelone planimentum*, Owen [4].
*Chelone breviceps*, Owen [5] (in parte).
*Thalassochelys planimentum*, Cope [6].
*Puppigerus breviceps*, Cope [7] (in parte).
*Glossochelys harvicensis*, Seeley [8].
*Pachyrhynchus planimentum*, Dollo [9].

The type of *Glossochelys*.

Adult skull vaulted and very short and wide, with the facial profile descending very suddenly between the orbits; mandible of the same type as that of the preceding species. Carapace with the antero- and postero-lateral surfaces of the neurals subequal; and the ribs slender, and occupying only a small moiety of the under surface of the broad costals. Coracoid [10] of adult with a narrow proximal portion, and a sudden expansion near the middle.

Assuming that the type skull and shell belonged to the same individual (and this seems to have been undoubtedly the case), the proportions between the two are nearly the same as in *Macroclemmys* in the *Chelydridæ*, the length of the skull being more than one third of that of the carapace. Even if the type skull of the so-called *Emys parkinsoni* be rightly regarded as that of a young individual of the present species, it seems unadvisable to adopt that specific name, since the figure is very unsatisfactory and there is no description. With regard to the carapace in the Norwich Museum figured by S. Woodward in the work cited as the type of *Chelone harvicensis*, it is probable, from the characters of the ribs, that it belongs to the present form. The contour of the neurals is,

[1] Rep. Brit. Assoc. for 1841, p. 178 (1842).—*Chelone*.
[2] Synoptical Table of British Organic Remains, p. 38, plate (1830).
[3] Syn. Rept. p. 33 (1831). [4] *Loc. cit.* [5] *Loc. cit.*
[6] Trans. Amer. Phil. Soc. vol. xiv. pt. i. p. 146 (1870). [7] *Ibid.* p. 235.
[8] Ann. Mag. Nat. Hist. ser. 4, vol. viii. p. 232 (1871).
[9] Bull. Mus. R. Hist. Nat. Belg. vol. iv. p. 138 (1886).
[10] Owen, Reptilia of the London Clay, &c. vol. i. pt. i. pl. x.

however, not shown, and since there is no description the adoption of this, the earliest name, seems inadvisable.

*Hab.* Europe (England).

**R. 1483.** Cast of the imperfect adult skull, with portions of the hyoids in position. The original, which is the type, was obtained from the London Clay (Lower Eocene) of Harwich, Essex, and is preserved in the Woodwardian Museum, Cambridge. Noticed by Owen in the 'Rep. Brit. Assoc.' for 1841, p. 178, and described and figured by him in his 'Reptilia of the London Clay, &c.' vol. i. pt. i. p. 25, pl. ix. Also described, with a figure of the occipital aspect, by Seeley, in the 'Ann. Mag. Nat. Hist.' ser. 4, vol. viii. p. 230. In the parietal region the bones are wanting in places, and the tip of the muzzle is broken away. In the mandible, although the anterior portion of the symphysis is wanting, yet the symphysis in its present condition has a length exceeding that of the postsymphysial part. The imperfect carapace which appears to have been associated with this skull, and is figured by Owen, *op. cit.* pl. x., and of the full size in his 'History of British Fossil Reptilia,' Chelonia, pl. xix., is stated by Seeley (*op. cit.* p. 227) to have perished. In that specimen the anterior and posterior lateral surfaces of the neurals are equal; while, as pointed out by Seeley (*op. cit.* p. 228, note), there is a small ninth costal, without a rib. The peculiar form of the coracoid is well displayed in that specimen.

*Made in the Museum*, 1889.

**37215.** Cast of an imperfect young skull apparently belonging to this species. The original was obtained from the London Clay of the Isle of Sheppey, and is stated by Owen to have formerly been in the Dixon Collection. It is one of the types of *Emys parkinsoni*, Gray, and is figured (reversed) by Parkinson in his 'Organic Remains,' vol. iii. pl. xviii. fig. 3; the cranium being figured by Owen in his 'Reptilia of the London Clay, &c.' vol. i. pt. i. pl. vi. fig. 4, and the mandible in pl. vii. fig. 3, as *Chelone convexa*. The extremity of the mandibular symphysis is wanting, but the remaining portion has the marked flatness characteristic of the present genus, and shows the same general contour as in the smaller specimens of *L. cantabrigiense*. Except for the larger relative size of the orbits, which is merely a character of immaturity, the specimen

agrees well in general characters with the type. It is evidently specifically the same as the next specimen.
*Bell Collection. Purchased*, 1863.

**38949.** (*Fig.*) The imperfect skeleton of a younger individual specifically identical with the preceding; from Sheppey. Figured by Owen in his 'Reptilia of the London Clay, &c.' vol. i. pt. i. pl. ii., and also in his 'History of British Fossil Reptilia,' Chelonia, pls. i., xvi., and xvii. fig. 6, as *Chelone breviceps*. The only ground for referring it to that species is the roughness of the bones; this character being due to immaturity in the present specimen, and to erosion in the type of the latter (see p. 42). The skull agrees closely with the preceding specimen, and shows the long and flattened mandibular symphysis characteristic of the present genus. The neurals of the carapace have the equal-sized lateral facets characteristic of the type shell; and the specimen is almost indistinguishable from the reduced figure of the larger carapace given in pl. xi. of the 'Reptilia of the London Clay.' The two sides of the plastron have been somewhat squeezed together, and the marginals are wanting. The left coracoid is shown, and is somewhat less suddenly expanded at the distal extremity than in the type; but this difference may well be due to immaturity. *Bowerbank Collection. Purchased*, 1865.

**R. 916.** Nodule showing the cast of the inner surface of a very large carapace; from Harwich. The slenderness of the ribs and the width of the costals are well shown. The characters of this specimen agree closely with those of the one figured by Owen in his 'Reptilia of the London Clay, &c.' vol. i. pt. i. pl. x. A. *No history.*

**R. 917.** Nodule with cast of the inner surface of a similar carapace; from Harwich. The boundaries of the wide costals and the narrow impressions formed by the ribs are clearly shown. *No history.*

**R. 915.** Nodule exhibiting a cast of the inner surface of a very similar carapace. In addition to the features displayed by the preceding specimens, the outlines of the equal-sided neurals are indistinctly shown. *No history.*

**R. 919.** A split nodule showing the inner surface of the imperfect carapace of a smaller individual, together with a cast of the same; from Harwich. The under surface corresponds precisely with that of the type carapace figured by Owen, *op. cit.* pl. x. The equal-sided neurals are well shown; and the slender ribs on the broad costals are equally distinctive. The cast exhibits the narrow grooves formed by the ribs, which are precisely the same as in the foregoing specimens. *No history.*

**28768.** An imperfect immature shell, specifically identical with the next specimen; from the London Clay of the Isle of Sheppey. The carapace shows the 2nd to the 6th neurals, and portions of the corresponding costals. The 4th neural is very narrow, and the middle line of the carapace somewhat depressed. *Purchased*, 1853.

**R. 3.** An imperfect shell, probably belonging to a young individual of this species; from the London Clay of the Isle of Sheppey. This specimen exhibits the first seven neurals and portions of the corresponding costals, the imperfect hyo- and hypoplastrals, and the scapulo-precoracoids. The neurals have the same contour as in the two preceding specimens, and the ribs have the same slenderness. The condition of the carapace and plastron of the present specimen indicates immaturity; and it would agree approximately in relative size with the skull No. 37215. *Purchased*, 1880.

**37207.** The imperfect shell of a younger individual; from Sheppey. The plastron is greatly damaged, but the middle region of the anterior two thirds of the carapace is well preserved. The equality in the size of the two lateral facets of the middle neurals is well shown. *Bell Collection.*

**R. 913.** Nodule showing a cast of the inner surface of a carapace probably referable to this species; from Harwich. *No history.*

**R. 914.** A nearly similar specimen; from Harwich. *No history.*

### Lytoloma, sp.

Syn. *Euclastes*, sp., Dollo [1].

The mandibular symphysis of this form is relatively wider, less pointed, and more concave than in the next species. The oral surface shows a pair of grooves apparently made by a median epidermal shield.

*Hab.* Europe (England).

**39113.** (*Fig.*) The imperfect mandible, in matrix; from the Chalk of Halling, Kent. Figured by Owen in his 'Cretaceous Reptilia' (Mon. Pal. Soc.), pt. i. pl. vii. A. figs. 4, 5; and referred to the present group by Dollo in the passage cited.
*Bowerbank Collection. Purchased*, 1865.

**R. 1498.** The imperfect symphysis of a similar mandible, from the Chalk; locality unknown. *No history.*

**35180.** The water-worn symphysis of an apparently similar mandible from the Cambridge Greensand. *Purchased*, 1859.

**30255.** The imperfect symphysis of a mandible apparently agreeing with the preceding. *Purchased*, 1855.

### Lytoloma cantabrigiense, Lydekker [2].

Very imperfectly known. Apparently allied in the structure of the mandible to *L. trigoniceps*; mandibular symphysis narrow, pointed, and very flat superiorly. The humerus provisionally referred has the head less oblique than in the typical forms, the radial process with a solid triangular surface, the shaft very much constricted, and the distal border very oblique to the latter. All the specimens indicate a comparatively small form.

*Hab.* Europe (England).

All the following specimens were obtained from the Cambridge Greensand.

**35178.** (*Fig.*) The mandible, imperfect posteriorly. The type specimen. Described and figured by the writer in the 'Quart. Journ. Geol. Soc.' vol. xlv. pp. 233, 234, fig. 2. All of the articular portion is wanting. *Purchased*, 1859.

**35179.** The symphysis of an apparently similar mandible, with the oral surface covered with phosphate. *Same history.*

[1] Ann. Soc. Géol. Nord, vol. xv. p. 122 (1888).
[2] Quart. Journ. Geol. Soc. vol. xlv. p. 233 (1889).

**30255 a.** A very similar specimen. *Purchased*, 1857.

**35189, 35190, 35192.** Three imperfect specimens of the symphysis of mandibles belonging either to the present or preceding form. *Purchased*, 1859.

**41797.** The imperfect symphysis of a mandible of the same general type. *Purchased*, 1864.

*The following type of humerus is provisionally referred to the present species. These bones agree in relative size with the mandibles, and the first of them may have been associated with the type mandible. They are in any case referable to the* Chelonidæ, *and differ from those of the type genus.*

**35175.** The right humerus. Figured by the writer in the 'Quart. (*Fig.*) Journ. Geol. Soc.' vol. xlv. p. 235, fig. 3. The middle of the shaft is wanting, and is restored in plaster, so that the contour of this is only approximate. With the exception of the solid radial process, and the greater constriction of the shaft, this specimen accords generally with the humerus of *Thalassochelys*. It also presents a striking resemblance to the two humeri figured by Leidy in his 'Cretaceous Reptilia of the United States' (Smiths. Contrib. Knowl. 1864), pl. viii. figs. 1–4, as those of *Mosasaurus*; and subsequently referred by Cope (see Rep. U. S. Geol. Surv. Terrs. vol. ii. p. 113, 1874) to the Athecata, under the names of *Protostega tuberosa* and *P. neptunia*. Those specimens differ markedly from the typical humerus of that genus, and appear to belong to the *Chelonidæ*. *Purchased*, 1859.

**35176.** The imperfect proximal extremity of a slightly larger left humerus. *Purchased*, 1859.

**35194.** The imperfect proximal extremity of a considerably larger right humerus. *Purchased*, 1859.

**35199.** The imperfect proximal extremity of a left humerus of considerably smaller size than No. 35175. *Purchased*, 1859.

**35207.** The distal extremity of a left humerus agreeing in size with No. 35176. *Purchased*, 1859.

**35207 a.** The distal extremity of a smaller left humerus. *Purchased*, 1859.

## Genus **NOTOCHELONE,** Lydekker[1].

Syn. *Notochelys*, Owen[2].

A provisional genus probably allied to *Lytoloma*. The hyo- and hypoplastrals completely anchylosed.

### **Notochelone costata** (Owen[3]).

Syn. *Notochelys costata*, Owen[4].

The type and only described species.
*Hab.* Australia (Queensland).

**R. 77.** Cast of the imperfect shell with some of the bones of the pectoral girdle and limbs. The original, which is the type, was obtained from the Cretaceous of the Flinder's River, Queensland, and is preserved in the Museum at Sydney; it is figured by Owen in the 'Quart. Journ. Geol. Soc.' vol. xxxviii. pp. 170, 192. *Made in the Museum*, 1881.

*It is uncertain whether the following specimen is referable to the* Chelonidæ *or to the* Athecata.

**39115.** (*Fig.*) Fragment of Chalk exhibiting the outer surface of a somewhat imperfect ridged bony plate; from the Chalk of Kent. Figured by Owen in his 'Cretaceous Reptilia' (Mon. Pal. Soc.), pt. i. pl. vii. A. fig. 8, as a marginal of *Chelone*. *Bowerbank Collection. Purchased*, 1865.

*The following specimens are probably referable to an existing species of this family.*

**R. 594.** Ten specimens of Chelonian eggs embedded in an oolitic matrix; from beds in Tasmania which are probably of Postpliocene age. *Presented by J. Abrahams, Esq.*, 1885.

[1] Geol. Mag. dec. iii. vol. vi. p. 325 (1889).
[2] Quart. Journ. Geol. Soc. vol. xxxviii. p. 178 (1882).—Preoccupied by Gray, 1863. [3] *Loc cit.—Notochelys.* [4] *Loc. cit.*

## Family TESTUDINIDÆ.

Ossification of shell complete; plastron connected with the carapace either by suture or a straight ligamentous junction; nuchal bone without distinct costiform processes; carapace more or less ovoid, and covered with epidermal shields. Caudal vertebræ procœlous. Skull with open temporal fossa; tympanic ring formed solely by quadrate; tympanic cavity closed posteriorly; bones of palate developing longer or shorter palatal plates to floor the narial passage. Scapula and precoracoid generally forming an obtuse angle at their junction; humerus more or less strongly curved, with the axis of the head widely removed from that of the shaft, and the radial process large and reaching above the level of the head (fig. 1, C). Pubis and ischium uniting to form an obturator foramen. Limbs with free digits, which are short or of moderate length; phalangeals with condyles; and the terminal claws either four or five in number. Both inframarginal and intergular shields are wanting.

This family is taken to include the *Cistudinidæ* and most of the *Emydidæ* of Gray.

### Genus **TESTUDO**, Linn.[1]

Including *Colossochelys*, Falconer and Cautley[2].
*Manouria*, Gray[3].

Neural bones short, and usually comprising an alternation of smaller tetragonal and larger octagonal ones (fig. 12), but occasionally hexagonal with short postero-lateral surfaces; costals alternately short and long at their inner and outer extremities; nuchal deeply emarginate. Suture between costal and marginal bones usually coincident with the sulcus between the corresponding shields; caudal shield usually single, but in some cases divided. Plastron extensively united with the carapace by suture, with short buttresses, which never extend beyond the edges of the costals; entoplastral usually anterior to the humero-pectoral sulcus; extremity of epiplastrals much thickened, and more or less distinctly produced anteriorly, so as to form a notch at gulo-pectoral sulcus; xiphiplastrals notched. Vertebral shields broad; pectorals very short. Skull with one or two ridges on oral surface of palate, and the pterygoids unusually wide, and much depressed in the middle line. Humerus (fig. 1, C) greatly curved, with the radial and ulnar processes approximated on the ventral aspect. Coracoid short and much expanded distally.

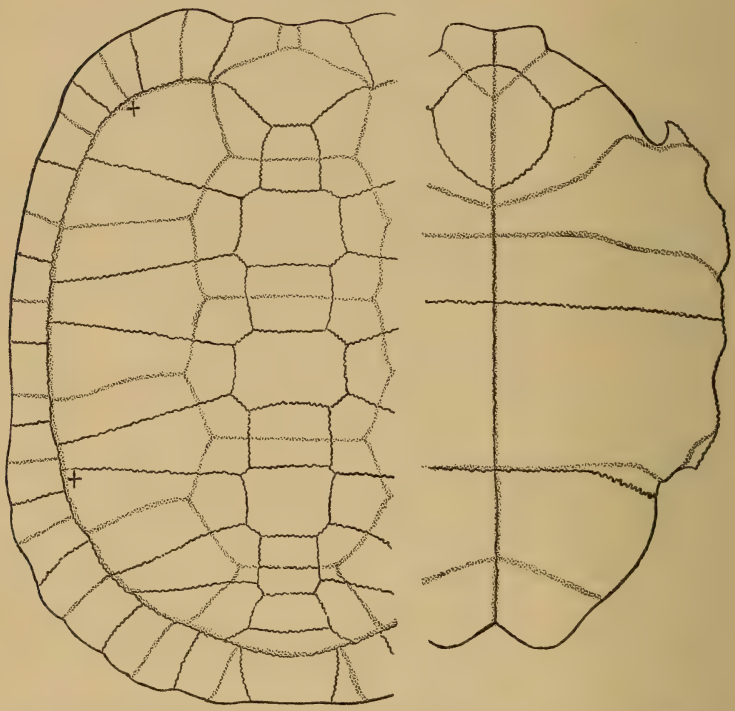
The entoplastral is usually broad, and not narrowed anteriorly. The heads of the ribs are aborted.

[1] Syst. Nat. éd. 6, vol. i. p. 350 (1766).
[2] Proc. Zool. Soc. 1844, p. 54.—As a subgenus.
[3] *Ibid.* 1852, p. 133.

The inclusion of *Manouria* (*Testudo emys*), in which the caudal shield is divided, in this genus [1] removes all grounds for the separation of *Colossochelys*, the greatly produced epiplastral cornua of the male of the latter not being of itself a generic character.

*Hadrianus*, Cope [2], from the Upper Eocene of North America, is distinguished by the narrow vertebral shields; the elongated neural bones, which are hexagonal, with short postero-lateral surfaces [3];

Fig. 12.



*Testudo ibera*.—Carapace and plastron, reduced. The ++ indicate the extremities of the axillary and inguinal buttresses. (From Boulenger's 'Catalogue of Chelonians.')

and the absence of alternation in the lengths of the extremities of the costal bones, the caudal shield being divided. In some of the undermentioned species from the Eocene and Miocene of Europe the neurals and costals are unknown, and there is accordingly no reason why they should not be referable to *Hadrianus*.

[1] See Boulenger, Catalogue of Chelonians, &c. p. 149 (1889).

[2] Proc. Amer. Phil. Soc. vol. xii. p. 468 (1873).

[3] See the figure of *Hadrianus* (*Testudo*) *corsoni* by Leidy in Rep. U. S. Geol. Surv. Terrs. vol. i. pt. i. pl. xi. (1873).

**Testudo robusta,** Leith-Adams[1].

Known by two vertebræ and limb-bones. The typical 5th cervical vertebra indicates a form somewhat larger than *T. nigra* (*elephantopus*), of the Galapagos Islands, but of stouter build, although with an equally long neck. The undermentioned specimens are referred to this species, since they agree in relative size with the vertebræ; in its elongated form the coracoid shows affinity with *T. inepta* of the Mauritius, to which the species may be allied.

*Hab.* Europe (Malta).

*The following specimens were obtained from the Pleistocene deposits of Zebbug Cave, and were presented to the Museum by Admiral Spratt, C.B., in* 1876.

**49327.** (*Fig.*) The imperfect left scapulo-precoracoid. Described and figured by Leith-Adams in the 'Quart. Journ. Geol. Soc.' vol. xxxiii. p. 180, pl. vi. figs. 3, 3 *a*, 3 *b*. The distal half of the scapula is wanting, and the whole of the precoracoid absent.

**49328.** (*Fig.*) The right coracoid, imperfect distally. Described and figured, *l. c.* p. 179, pl. v. figs. 2, 2 *a*. In its extremely elongated form this bone agrees with the coracoid of *T. inepta* figured by Haddon in the 'Trans. Linn. Soc.' ser. 2, Zool. vol. ii. pl. xiii. fig. 6.

**49329.** (*Fig.*) The left radius. Described and figured, *l. c.* p. 182, pl. vi. fig. 1.

**49330.** (*Fig.*) A smaller specimen of the left radius. Described and figured, *l. c.* p. 182, pl. vi. figs. 2, 2 *a*.

**49331.** (*Fig.*) The right tibia. Described and figured, *l. c.* p. 185, pl. v. figs. 3, 3 *a*.

**49332–4.** (*Fig.*) Three terminal phalangeals, two of which are imperfect. Described and figured, *l. c.* p. 183, pl. v. figs. 5–7.

**49336.** The distal half of a left fibula probably referable to this species. Described, *l. c.* pp. 186–7.

**49337.** Part of the right pubis. Noticed, *l. c.* p. 183.

**49338.** Fragment of a pubis. Noticed, *l. c.* p. 184.

**49339.** Part of the symphysial portion of the right pubis. Noticed, *l. c.* p. 184.

[1] Quart. Journ. Geol. Soc. vol. xxxiii. p. 178 (1877).

### Testudo spratti, Leith-Adams[1].

Founded on a tibia, which differs from that referred to *T. robusta* by the deeper groove on the astragalo-calcaneal aspect, and by the presence of two muscular tuberosities on the anterior aspect. This specimen indicates a smaller form than *T. robusta*.

*Hab.* Europe (Malta).

49335. (*Fig.*) The left tibia; from the Pleistocene deposits of Zebbug Cave, Malta. The type specimen; described and figured by Leith-Adams in the 'Quart. Journ. Geol. Soc.' vol. xxxiii. p. 186, pl. vi. figs. 4, 4 *a*.

*Presented by Admiral Spratt, C.B.*, 1876.

### Testudo atlas (Falconer and Cautley[2]).

Syn. *Megalochelys sivalensis*, Falconer and Cautley[3].
*Colossochelys atlas*, Falconer and Cautley[4].
*Testudo atlas*, Lydekker[5].

Of very large dimensions, the length of the carapace being approximately six feet. The chief feature of this species is the great production of the epiplastral cornua, which (at least typically) are very large, thick, and divergent, and supported on the ventral aspect by a strong triangular keel bearing the gular shields. In the nuchal bone referred by Falconer to this species there is no nuchal shield; while in the pygal referred to it by the same authority the caudal shield is divided. The marginal bones have their longer diameter at right angles to the periphery of the carapace, and thereby resemble those of *T. emys* and *T. radiata*, and differ from *T. elephantina* and other giant tortoises of the present day, in which the other diameter is the longer. The cranium which probably belongs to this species agrees in structure with the crania of the giant tortoises of Aldabra, having the same deep excavation of the palate, and the opisthotics comparatively short and not extending posteriorly to the plane of the posterior border of the occipital condyle (fig. 14 B).

This species appears to be allied to *T. perpiniana*, Depéret[6], from the Pliocene of France, in which the carapace has a length of 1,200,

[1] Quart. Journ. Geol. Soc. vol. xxxiii. p. 186 (1877).
[2] Proc. Zool. Soc. 1844, p. 54.—*Colossochelys*.
[3] Journ. As. Soc. Bengal, vol. vi. p 358 (1837).—Subsequently withdrawn.
[4] Proc. Zool. Soc. 1844, p. 54.
[5] Journ. As. Soc. Bengal, vol. xlix. pt. ii. p. 20 (1880).
[6] Ann. Sci. Géol. vol. xvii. art. i. p. 214 (1885). *See* also Comptes Rendus, vol. cv. p. 1275 (1887).

and is of the depressed form of *T. emys*, while the limbs were covered with dermal ossicles as in the latter and the present species.

Since there is no evidence that the whole of the bones referred by Falconer to this species really belong to it, it will be convenient to take the epiplastrals, No. 40603, as the real type. From the large size of the undermentioned nuchal it is, however, probable that that specimen is rightly referred to this species; but the reference of some of the other specimens mentioned below must be regarded as provisional.

Several of the undermentioned specimens were employed by Falconer as models in the construction of the plaster restoration of the shell exhibited in the reptile gallery. The length of the carapace as thus restored exceeds eight feet, but, as will be shown below, both the length and breadth of this restoration are too large[1].

The nearest approximation to the remarkable development of the epiplastrals of this species to be met with among existing forms is found in the genus *Cinyxis*, where the cornua of the male are usually more produced than in the female, although there is great individual variation.

*Hab.* India (Siwalik Hills).

*The following specimens were obtained from the Pliocene of the Siwalik Hills.*

**R. 326 a.** The nearly entire nuchal bone, with a small fragment of the first marginal of the left side and a larger fragment of that of the right side still attached. This specimen, which may be regarded as one of the types, shows the absence of a nuchal shield. The length of its anterior border is 0,278 (11 inches) against 0,234 (9·2 inches) in *T. elephantina*. The antero-posterior diameter must however, have been proportionately much greater than in the nuchal of the latter.

*Transferred from the Indian Museum*, 1880.

**16903.** The 1st and 2nd marginals of the left side. Two of the types. These bones have their two diameters nearly equal, and the sulcus dividing the costal and marginal shields placed considerably below their upper border, in both which respects they resemble *T. radiata*, and differ

[1] In the published notices by Falconer and Cautley the length of the carapace was estimated at more than 12 feet. *See* 'Palæontologia Indica,' ser. 10, vol. iii. p. 160, note 1.

from *T. elephantina*. In Falconer's restoration of the carapace these bones are placed at a considerable interval from the nuchal bone, as if there were some four preaxillary marginals, thus making the carapace much too large. The anterior border of the first marginal is imperfect.

*Cautley Collection. Presented*, 1840.

**16903 a.** Part of the left side of the shell. This specimen, which belongs to the same individual as the preceding, shows the axillary notch, and a considerable portion of the plastron and carapace in the neighbourhood of the bridge.

*Cautley Collection.*

**16909.** The 1st marginal bone of the left side, with the antero-internal angle broken away. A small fragment of the 2nd marginal is attached to the postero-internal angle. The whole of the free border is entire.

*Cautley Collection.*

**16904.** The posterior portion of the 2nd and the nearly entire 3rd marginal of the left side. This and the preceding specimen present all the characters of the above-mentioned marginals and are therefore provisionally referred to the same species. The axillary buttress of the hyoplastral is well displayed on the inner surface of the 3rd marginal, and extending superiorly on to the 2nd.

*Cautley Collection.*

**R. 326 c.** The imperfect 7th and 8th marginals of the left side. Types. In Falconer's restoration this specimen is separated by a long interval from the next, instead of being separated by the width of only one marginal.

*Transferred from the Indian Museum*, 1880.

**R. 326 b.** The posterior extremity of the carapace. One of the types. This specimen comprises the pygal, and portions of the 11th and 10th marginals, although the sutures between these bones are not exhibited. Nearly the whole of the area occupied by the caudal shields is shown, the division between the two being clearly indicated.

*Transferred from the Indian Museum*, 1880.

**16897.** The right inguinal region of the carapace. One of the types. Includes nearly the whole of the 7th and 8th marginals, and the anterior extremity of the 9th. The

marginals show the great length of the transverse diameter, in which respect they resemble those of *T. emys*, and are totally different from those of *T. elephantina*. In Falconer's restoration this specimen is separated by too large an interval from the preceding.

*Cautley Collection.*

**R. 326 d.** The right inguinal region of the carapace showing the greater portions of the 7th and 8th marginal bones. These bones, of which the superior border is wanting, precisely resemble those of the preceding specimen.

*Transferred from the Indian Museum*, 1880.

**R. 326 e.** The imperfect 7th and 8th marginal bones of the right side. *Transferred from the Indian Museum*, 1880.

**40603.** (*Fig.*) The imperfect epiplastrals of an adult (? male). Figured in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxx. fig. 1, and also by the present writer in the 'Palæontologia Indica' (Mem. Geol. Surv. Ind.), ser. 10, vol. iii. pl. xviii. figs. 1, 1 *a*. This specimen may be taken as the actual type. *Presented by Dr. Hugh Falconer*, 1845.

**16940.** The imperfect epiplastrals of an adult. The extremity of the right cornu and the posterior portion of the ventral carina are broken away. The dorsal surface of the produced portion is much wider than in the preceding specimen. *Cautley Collection.*

**16941.** The imperfect epiplastrals and entoplastral of an adult. The extremities of the cornua are broken away.

*Cautley Collection.*

**R. 326 i.** The imperfect produced portion of the epiplastrals. The cornua, of which the left one is entire, are shorter and blunter than in the preceding specimens.

*Transferred from the Indian Museum*, 1880.

**R. 920.** The posterior extremity of the epiplastral carina.

*Cautley Collection.*

**16955.** The right epiplastral of a much smaller tortoise, which may be a young individual of this species. This specimen is nearly of the size of the epiplastrals of *T. punjabiensis*,

from which it is at once distinguished by the presence of a thickened ridge on the ventral aspect.

*Cautley Collection.*

**40629.** (*Fig.*) The posterior extremity of the plastron. Figured in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxx. fig. 2, and noticed by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. p. 159. The xiphiplastral cornua are entire. *Presented by Dr. Hugh Falconer*, 1845.

**R. 326 r.** Part of the right side of the plastron. One of the types. This specimen shows the inguinal notch, and a considerable portion of the hypo- and xiphiplastrals. From the concavity of the ventral surface it apparently indicates a male individual.

*Transferred from the Indian Museum*, 1880.

*Of the following specimens, while some are doubtless referable to the present species, it is probable that others belong to the next form.*

**39819.** (*Fig.*) The imperfect cranium. Figured in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxxi. fig. 1, and also by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pl. xix. figs. 3, 3 *a*, 3 *b*. This specimen would indicate a carapace of about 6 feet in length, and might therefore well belong to the present species. In the extreme excavation of the palate it agrees with the gigantic tortoises of the Aldabra group, and more especially with *T. elephantina*[1]—the resemblance to the skull of the latter species being especially shown in the emargination of the lateral ridges of the pterygoids, the deep pit between the quadratic condyle and the basisphenoid, and the deep depression on the basioccipital. The aperture leading to the auditory labyrinth has moreover the same large size as in the Aldabra tortoises; and it would seem probable that the opisthotic did not extend beyond the plane of the occipital condyle, as is the case in all those tortoises (fig. 14, B). *Cautley Collection.*

**R. 956.** The 2nd neural bone. This specimen is about one and a

[1] *See* Günther, 'Gigantic Land-Tortoises,' pls. viii., ix.—*T. ponderosa* is considered by Boulenger (Cat. Chelonians, p. 167) to be identical with *T. elephantina*.

half times the size of the 2nd neural of *T. elephantina*, and has the same octagonal contour. *Cautley Collection.*

**16943.** The imperfect proximal portion of the 8th costal of the right side. *Cautley Collection.*

**R. 940.** A smaller imperfect 8th costal of the right side. *Cautley Collection.*

**7456.** Part of the posterior region of the carapace; from the Siwaliks of Burma. This specimen exhibits a considerable portion of the area occupied by the 5th vertebral shield. The 8th neural and anterior suprapygal bones are shown; and also parts of the 7th and 8th costals and an additional costal. The specimen is abnormal in that the 7th in place of the 8th costal has the large capitular facet. *Mantell Collection. Purchased*, 1838.

**16907.** A first left marginal. This specimen apparently differs from the 1st marginal referred to *T. atlas* in that its longer diameter is in the direction of its free border, in which respect it agrees with *T. elephantina*. It may be referable to the next species. *Cautley Collection.*

**16993.** An imperfect anterior marginal of the left side. *Cautley Collection.*

**16933.** A more imperfect and smaller anterior (?) marginal. *Cautley Collection.*

**R. 935.** The imperfect 8th and 9th marginal bones of the right side of a carapace which would agree in relative size with the preceding; from the Siwalik Hills. When entire these specimens would have had the same type of contour that characterizes the preceding. *Cautley Collection.*

**R. 883.** The pygal bone of a male. This specimen, agrees in contour with the pygal of *T. atlas*, No. R. 326 *b*, but has the caudal shield undivided. *Cautley Collection.*

**R. 326 g.** An imperfect pygal, and part of the 11th marginal of the left side. In this specimen, which is probably that of a female, the caudal shield is likewise undivided. *Transferred from the Indian Museum.*

**17969.** The imperfect and flattened posterior extremity of a carapace which may belong to a female of *T. atlas*. The dorsal surface is much damaged, but the caudal shield is clearly seen to have been divided. *Cautley Collection.*

**R. 326 f.** The flattened posterior extremity of a carapace probably belonging to a female. The area of the undivided caudal shield is clearly shown; while portions of the areas occupied by the 5th vertebral and the 11th marginal shields are also exhibited. This specimen is employed in Falconer's restoration of the lateral borders of the anterior lobe of the plastron of *T. atlas*.

*Transferred from the Indian Museum*, 1880.

**16996.** Part of the left side of the posterior lobe of the plastron. This specimen exhibits the postinguinal portion of the hypoplastral, and a large part of the xiphiplastral, although the cornu of the latter is wanting. *Cautley Collection.*

**16917.** The xiphiplastral cornua. *Cautley Collection.*

**16968.** The left xiphiplastral cornu of an individual agreeing in size with the preceding. *Cautley Collection.*

**16518.** (*Fig.*) The right humerus, wanting the distal extremity. Figured in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxxi. figs. 4, 5 (as a femur), and also by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pl. xix. fig. 2. Falconer estimated this specimen as comprising only half the original, and this view was adopted by the writer in the restoration given in the figure cited. Subsequent comparison shows, however, that not more than about one third is really wanting; and that the total length from the head to the condyles was probably about 0,506 (20 inches), against 0,305 (12 inches) in an adult of *T. elephantina*. The proportions obtaining between this specimen and the cranium No. 39819 are very nearly the same as those between the corresponding elements of the last-named species. *Cautley Collection.*

**16912.** The proximal extremity of a similar right humerus. Noticed by the writer *op. cit.* p. 160, as No. 39820 *a*.

*Cautley Collection.*

**39820.** The proximal half of the left humerus. This specimen,

which is noticed by the writer, *loc. cit.*, agrees in size with the preceding. *Presented by Dr. Hugh Falconer*, 1845.

**R. 327.** The imperfect proximal extremity of a similar left humerus. *Transferred from the Indian Museum*, 1880.

**16911.** The proximal half of a smaller left humerus. If the preceding specimens (as is probably the case) are referable to *T. atlas*, this and the following specimen may belong to the next form. *Cautley Collection.*

**R. 933.** The proximal extremity of a nearly similar left humerus. *Cautley Collection.*

**16915.** The distal extremity of a very large left humerus. *Cautley Collection.*

**39825.** (*Fig.*) The distal extremity of a right humerus agreeing in size with No. 16518. Figured in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxxi. fig. 3; and noticed by the writer *op. cit.* pp. 160–161, where it was regarded as indicating a smaller animal than No. 16518. *Presented by Dr. Hugh Falconer*, 1845.

**R. 934.** The distal extremity of a considerably smaller right humerus. *Cautley Collection.*

**R. 327.** The distal portion of a left humerus agreeing in size with No. 39825. *Transferred from the Indian Museum*, 1880.

**48455.** The distal portion of a slightly larger left humerus. The trochlear surface is somewhat broken and waterworn. *Presented by C. Falconer, Esq.*, 1867.

**16519.** The imperfect distal portion of a rather smaller left humerus. *Cautley Collection.*

**39823.** The left acetabular region of the pelvis. This specimen, which agrees in relative size with the largest humeri, is noticeable in that the three pelvic elements are completely fused together to form an innominate bone. *Presented by Dr. Hugh Falconer*, 1845.

**39822.** The imperfect symphysial region of the pubes. This specimen probably belonged to the same individual as the preceding. *Presented by Dr. Hugh Falconer*, 1845.

**39824.** The imperfect symphysial region of the ischia. Probably associated with the two preceding specimens. *Presented by Dr. Hugh Falconer*, 1845.

**16913.** (*Fig.*) The imperfect proximal extremity of a right femur agreeing in relative size with the largest specimens of the humerus. Figured in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxxi. fig. 2 (as a humerus), and noticed by the writer, *op. cit.* p. 161. *Cautley Collection.*

**17966.** The proximal extremity of a similar left femur. *Cautley Collection.*

**17966 a.** The adjacent extremities of the right femur, tibia, and fibula, cemented together by matrix. This specimen belonged to a smaller individual than the preceding. *Cautley Collection.*

**16914.** The distal extremity of a left femur agreeing in relative size with No. 17966. *Cautley Collection.*

**16916.** The imperfect distal portion of a similar left femur. *Cautley Collection.*

**R. 938.** A right tibia, wanting the proximal extremity, which agrees in relative size with the preceding specimen. *Cautley Collection.*

**18459.** A smaller right tibia, wanting the proximal extremity. *Cautley Collection.*

**R. 941.** A mass of matrix containing a number of foot-bones and dermal scutes apparently referable to the left manus. *Cautley Collection.*

**R. 942.** A mass of matrix containing foot-bones and dermal scutes of a much smaller tortoise. This specimen may belong to *T. cautleyi*. *Cautley Collection.*

**18025.** An imperfect terminal phalangeal. This and the following specimens agree in relative size with the largest humeri. *Cautley Collection.*

**36731.** (*Fig.*) A terminal phalangeal. Figured in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxx. figs. 3–5. *Cautley Collection.*

**39826.** A terminal phalangeal, wanting the distal extremity. *Presented by Dr. Hugh Falconer*, 1845.

**39827.** A terminal phalangeal. *Presented by Dr. Hugh Falconer*, 1845.

**36732.** A terminal phalangeal. *Cautley Collection.*

**R. 943.** A terminal phalangeal. *Cautley Collection.*

**R. 944.** A terminal phalangeal. Apparently belongs to the fifth digit of the left manus. *Cautley Collection.*

**36729–30.** Two dermal scutes of the limbs. *Cautley Collection.*

### **Testudo,** sp.

The undermentioned epiplastrals, which indicate a tortoise nearly as large as *T. atlas*, are distinguished from the corresponding bones of the latter by their relatively thinner cornua and the absence of the ventral carina. The nuchal, No. R. 882, indicates a species distinguished from *T. atlas* by the presence of a nuchal shield; and since that specimen agrees in relative size with the epiplastrals, it might well belong to the same form. If this should prove to be the case, we should have decisive evidence that the undermentioned epiplastrals are not referable to female individuals of *T. atlas*. The nuchal would appear to be too large to be referable to *T. cautleyi*.

*Hab.* India (Siwalik Hills).

*The following specimens are from the Pliocene of the Siwalik Hills.*

**R. 930.** The imperfect epiplastral cornua, probably referable to an adult male. Nearly the whole of the right cornu and the extremity and posterior border of the left one are broken away. When entire the cornu must have been larger and more divergent than in any of the specimens referred to *T. atlas*, and the absence of the inferior carina is well shown. A specimen of nearly equal size, but with less developed cornua, is figured by the writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pl. xviii. fig. 4.
*Cautley Collection. Presented*, 1840.

**R. 931.** The imperfect epiplastral cornua. This specimen, in which a large part of the right cornu remains, is of the same general type as the preceding, but the cornu is even more expanded, its characteristic thinness being well shown.
*Cautley Collection.*

**R. 932.** An imperfect bone which appears to be part of the epiplastral cornua of the same type as the preceding.
*Cautley Collection.*

**R. 928.** The imperfect epiplastral. These specimens, in which the cornua are very slightly developed, are probably referable

to a female or immature male of this form. The absence of the ventral carina is well shown. *Cautley Collection.*

**16693.** The produced portion of similar epiplastrals. *Cautley Collection.*

**R. 927.** The anterior extremity of a plastron referable to the same form as the two preceding specimens. The epiplastrals are nearly entire. *Presented by Dr. Hugh Falconer*, 1845.

**R. 929.** The imperfect anterior extremity of a plastron not improbably referable to this form. The produced extremities of the epiplastrals are wanting, but on the ventral aspect the area occupied by the posterior portion of the gular shields is similar to that of the last specimen. *Cautley Collection.*

**17968.** An entoplastral and portions of the adjacent bones, not improbably referable to this species. *Cautley Collection.*

**R. 882.** The anterior portion of a nuchal bone, which agrees fairly well in relative size with the above-mentioned epiplastrals, and may therefore be referable to the same species. This specimen shows the area occupied by a large and elongate nuchal shield, and, thereby, indicates a different species from the nuchal referred to *T. atlas*. The length of the anterior border is nearly the same as in the latter. It would of course equally indicate the existence of two large Siwalik tortoises if the present specimen belonged to *T. atlas* and the above-mentioned nuchal to the present form; but the massiveness of the latter bone favours Falconer's reference. *Cautley Collection.*

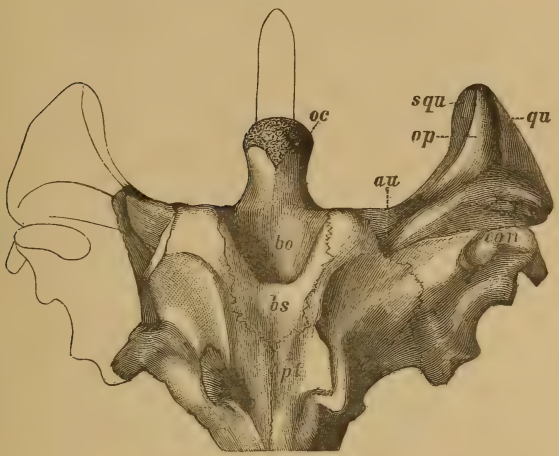
### **Testudo,** sp.

The undermentioned cranium indicates a tortoise of considerably larger size than *T. elephantina*, and allied in cranial structure to the tortoises of the Mascarene and Galapagos Islands. It cannot be determined whether this specimen should be referred to the preceding form or to a large individual of *T. cautleyi*. It is clearly quite different from the cranium No. 39819 mentioned under the head of *T. atlas*.

*Hab.* India.

**39828.** The imperfect cranium; from the Pliocene of the Siwalik Hills. Described and figured by the writer in the 'Rec. Geol. Surv. Ind.' vol. xxii. pt. iv. The posterior palatal and occipital region (fig. 13) is well preserved, and serves (*Fig.*)

Fig. 13.



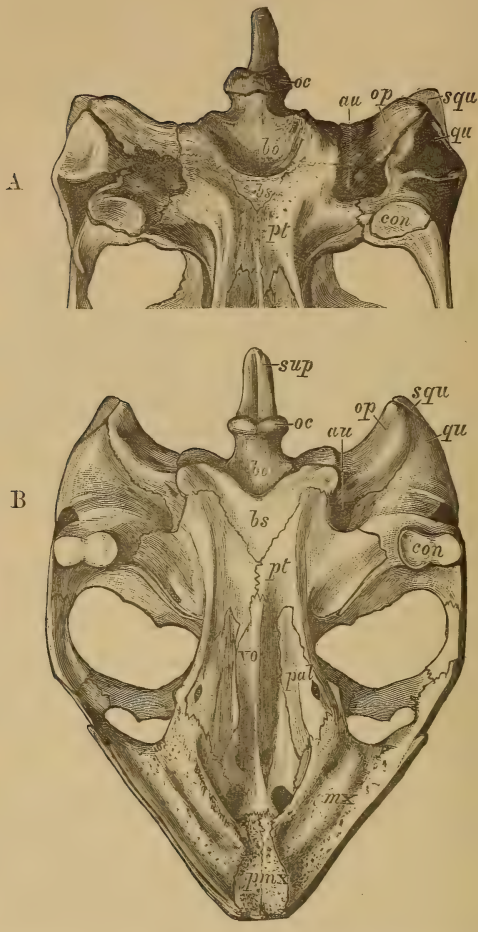

*Testudo*, sp.—The palatal aspect of the posterior portion of the cranium; from the Pliocene of the Siwalik Hills. ½. *au*, auditory aperture; *bo*, basi-occipital; *bs*, basisphenoid; *con*, condyle of quadrate; *oc*, occipital condyle; *op*, opisthotic; *pt*, pterygoid; *qu*, quadrate; *squ*, squamosal. (From the 'Rec. Geol. Surv. Ind.')

to show the affinity of this specimen with the tortoises of the Galapagos Island (fig. 14, B) and its difference from those of the Aldabra group[1]. This affinity is at once shown by the plate-like and curved form of the opisthotic, which extends behind the plane of the occipital condyle; and also by the narrow and slit-like form of the entrance to the labyrinth. The vaulting of the pterygoids is comparatively slight. The absence of a pit between the quadrate and the basisphenoid is alone sufficient to distinguish this specimen from the cranium No. 39819 (p. 78).

*Cautley Collection. Presented*, 1840.

[1] The Mascarene tortoises, while nearest to those of the Galapagos Islands, have the opisthotics less produced backwardly.

Fig. 14.




*Testudo elephantina* (A) and *T. microphyes* (B).—Palatal aspect of the cranium. ⅔. *au*, auditory aperture; *bo*, basioccipital; *bs*, basisphenoid; *con*, condyle of quadrate; *mx*, maxilla; *oc*, occipital condyle; *op*, opisthotic; *pal*, palatine; *pmx*, premaxilla; *pt*, pterygoid; *qu*, quadrate; *squ*, squamosal; *sup*, supraoccipital spine; *vo*, vomer. (From the 'Rec. Geol. Surv. Ind.')

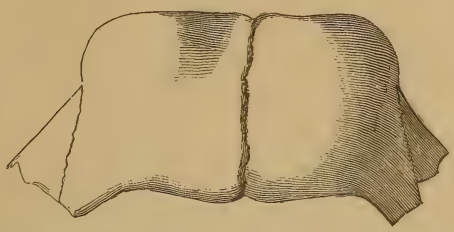
**Testudo cautleyi,** Lydekker, n. sp.

Known by the epiplastrals, which indicate a species of the approx mate size of *T. elephantina*, and characterized by a similar slight production of the anterior extremity of these bones.

*Hab.* India (Siwalik Hills).

**R. 937.** The epiplastrals, imperfect posteriorly; from the Pliocene (*Fig.*) of the Siwalik Hills. The type; figured in woodcut fig. 15. *Cautley Collection. Presented*, 1840.

Fig. 15.



*Testudo cautleyi.*—Anterior extremity of the epiplastrals, viewed from the dorsal aspect; from the Pliocene of the Siwalik Hills. ¼. (From the 'Rec. Geol. Surv. Ind.')

**R. 955.** The thickened portion of the epiplastrals of a somewhat smaller individual; from the Siwalik Hills. The complete anchylosis of the two component bones in this and the preceding specimen indicates maturity.

*Cautley Collection.*

*The following specimens indicate Tortoises agreeing more or less nearly in relative size with this Species.*

**22150 x.** The proximal half of the left humerus; from the Siwaliks of Perim Island, Gulf of Cambay. This specimen is considerably smaller than the humerus of *T. elephantina* figured in Günther's 'Gigantic Land-Tortoises,' pl. xvi.

*Presented by Dr. Beust*, 1849.

**R. 951.** The distal extremity of the right humerus of a smaller Tortoise; from the Siwaliks. *Cautley Collection.*

**R. 953.** The proximal half of the right femur of a Tortoise of considerably larger dimensions than the one to which the humerus No. 22150 *x* pertained; from the Siwaliks.

*Cautley Collection*

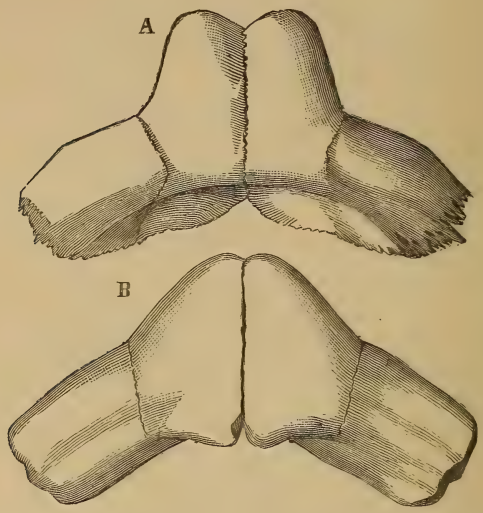
**Testudo punjabiensis,** Lydekker, n. sp.

About one fourth smaller than the existing *T. elephantina*, with the epiplastrals much thickened, and produced anteriorly after the manner of the existing *T. emys* (fig. 16, A), but apparently without

a distinct median notch. The nuchal bone probably referable to this species has a large and elongated nuchal shield. Probably allied to *T. emys*.

*Hab.* India (Punjab).

Fig. 16.




*Testudo emys* (A) and *T. punjabiensis* (B).—The epiplastrals, viewed from the dorsal aspect. A, ½. B, ⅓. (From the 'Rec. Geol. Surv. Ind.')

**R. 599.** Cast of the slightly imperfect right epiplastral. The original, which is the type, was obtained from the Pliocene Siwaliks of the Punjab, and is preserved in the Indian Museum, Calcutta. It is figured by the writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pl. xix. figs. 1, 1 *a*, in conjunction with the next specimen. It is also figured in woodcut fig. 16, B. *Made in the Museum*, 1885.

**R. 599 a.** Cast of the left epiplastral, slightly imperfect on the postero-internal border. The original, which was obtained from the Punjab, is likewise preserved in the Indian Museum, and is represented in the figure cited.

*Made in the Museum*, 1885.

**R. 600.** Cast of a nuchal bone, probably referable to this species. The original was obtained from the same district as the preceding specimen, and is preserved in the Indian Museum; it is figured by the writer, *op. cit.* pl. xix. fig. 4.

*Made in the Museum*, 1885.

**Testudo sloanei,** Lydekker, n. sp.

Imperfectly known, but in its extremely vaulted carapace allied to *Testudo pardalis* of Africa, or to *T. radiata* of Madagascar, with both of which it agrees in the absence of swelling in the shields; epiplastrals produced only to a small extent. This form seems to be certainly specifically distinct from all sufficiently described Tertiary species, and is probably not identical with any living form. The type shell has a length of about 0,180 (7·1 inches).

*Hab.* Turkey.

R. 1587. The imperfect shell; from Tertiary beds in Turkey. The type specimen. The neurals and most of the costals of the carapace are preserved, but the marginals are wanting, and the plastron is imperfect. In the MS. Catalogue of Sir Hans Sloane's collection this specimen (No. 1821) is entered as "a petrified common land tortoise, filled with hard stony chalk, from Turkey."

*Sloane Collection. Purchased, about* 1754.

**Testudo escheri,** Pictet & Humbert [1].

Shell moderately vaulted, more than twice as long as deep; shields strongly striated; posterior border somewhat everted, and probably serrated; vertebral shields not broader than costals; nuchal and caudal shields unknown. Plastron only slightly produced anteriorly; entoplastral wider than long; xiphiplastrals angularly notched; pectoral shields extremely short.

The type specimen has a length of 0,250 (9·9 inches), but the undermentioned entoplastral indicates a larger individual, equal in size to *T. radiata*.

*Hab.* Europe (Switzerland).

R. 1516. Cast of an entoplastral bone probably referable to this species. The original was obtained from the Middle Miocene of Chaux-de-Fonds, Switzerland, and is figured by Pictet and Humbert in their 'Chéloniens de la Molasse Suisse,' pl. xv. figs. 1, 1 *a*, without specific name. The plastron of the type shell of *T. escheri*, which was obtained from the same horizon, is represented in pl. iii. of the same memoir; its entoplastral, although smaller than the present specimen, has the same general characters.

*Egerton Collection. Purchased,* 1882.

[1] Paléontologie Suisse—Chéloniens de la Molasse, p. 17 (1856).

R. 1516 a. Cast of an anterior marginal, referred by Pictet and Humbert to the same species as the preceding specimen. The original was obtained from Chaux-de-Fonds, and is figured *op. cit.* pl. xv. figs. 2, 2 *a*, 2 *b*. It was suggested by its describers that this specimen might have belonged to the same individual as the preceding, but it indicates a much smaller form, which may be generically distinct.

*Egerton Collection.*

### **Testudo larteti,** Pictet [1].

Syn. *Testudo gigantea*, Lartet [2].

An undescribed species, in which the carapace is stated to have a circumference of 8 or 9 feet. The undermentioned specimen indicates a species of the approximate size of the existing *T. microphyes*.

*Hab.* Europe (France).

40772. The left precoracoid of a large Tortoise, probably referable to this species; from the Middle Miocene of Sansan (Gers), France. The length is 0,095 (3·7 inches).

*Presented by C. Falconer, Esq.*, 1867.

### **Testudo eurysternum,** Gervais [3] (*ex* Pomel).

Known by fragments of the carapace and plastron, which indicate a species agreeing approximately in size with *T. radiata*, but with relatively thicker and somewhat more produced epiplastrals.

*Hab.* Europe (France).

30940. The imperfect right epiplastral; from the Lower Miocene (Upper Oligocene) of St. Gérand-le-Puy (Allier), France. This specimen, of which the anterior extremity is wanting, agrees with the epiplastrals of the type specimen figured by Gervais (in a reversed position) in his 'Zool. et Pal. Françaises,' pl. liii. figs. 8, 8 *a*, which is from the same deposits. *Bravard Collection. Purchased*, 1852.

[1] Traité de Paléontologie, 2nd ed. vol. i. p. 444 (1853).
[2] Notice sur la Colline du Sansan, p. 38 (1851).—Preoccupied.
[3] Zool. et Pal. Françaises, 1st ed. p. 243 (1848–52).

### **Testudo,** sp.

Known by an anterior marginal, which indicates a species about two and a half times the dimensions of *T. radiata*. This marginal agrees with the corresponding bone of *T. radiata* and *T. atlas* in having its longer diameter at right angles to the periphery of the carapace, and is thereby distinguished from *T. elephantina* (see p. 74). This form may be identical with the Miocene *T. gigas*, Bravard [1].

*Hab.* Europe (France).

R. 414. The second marginal bone of the left side; from the Upper Eocene (Lower Oligocene) Phosphorites of Bach, near Lalbenque (Lot), France. Longer diameter 0,140 (5·5 inches), shorter diameter 0,080 (3·15 inches).

*Purchased*, 1884.

## Genus **HOMOPUS,** Duméril & Bibron [2].

Shell with the general characters of that of *Testudo*, but with the neural bones (fig. 17) mostly hexagonal, and the anterior ones more or less distinctly short-sided behind. Epiplastrals only slightly thickened anteriorly. Caudal shield undivided; vertebral shields hexagonal and comparatively wide. Palate without oral ridge.

### **Homopus scutella** (Meyer [3]).

Syn. *Emys scutella*, Meyer [4].

Known only by flattened shells, which apparently indicate a species closely allied to the existing South-African *H. areolatus*, with which the fossil agrees in size, and in the swollen dorsal shields, of which the areolæ were depressed and surrounded by concentric grooves.

That the plastron was suturally united with the carapace in this form was first pointed out by Winkler in the work cited below. In the type specimen figured by Meyer in his 'Säugethiere etc. aus dem Molasse,' pl. 7. fig. 2, the form of the first three costals and also the characteristic alternation in the length of the extremities of the costals are clearly shown.

*Hab.* Europe (Switzerland).

[1] *See* Gervais, Zool. et Pal. Françaises, 2nd ed. p. 436.

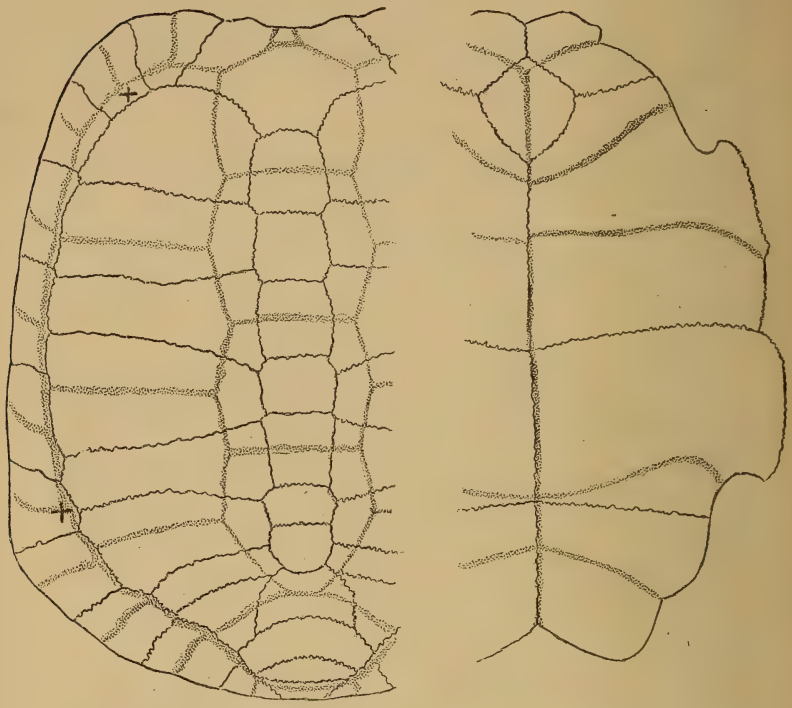
[2] Erpétologie générale, vol. ii. p. 145 (1835).

[3] Fauna der Vorwelt—Säugethiere, &c., aus dem Molasse, p. 17 (1845).—*Emys*.

[4] *Loc. cit.*

**42886.** Slab of rock showing the dorsal aspect of the imperfect (*Fig.*) carapace, in a flattened condition ; from the Upper Miocene

Fig. 17.



*Homopus areolatus*.—Carapace and plastron. The + + indicate the termination of the axillary and inguinal buttresses. (From Boulenger's ' Catalogue of Chelonians.')

of Œningen, Switzerland. Figured by Winkler in his ' Tortues Fossiles ' (Haarlem, 1869), pl. xxi. fig. 65. The areolation of the dorsal shields is well shown in this specimen, but still more clearly in the one represented in fig. 63 of the same plate. In the figure the boundaries of the bones are not indicated, but the contour of the first four neurals and adjacent costals is clearly visible in the specimen ; and these bones agree in all respects with those of the existing form.

*Van Breda Collection. Purchased*, 1871.

### **Homopus comptoni** (Bell [1]).

Syn. *Emys comptoni*, Bell [2].

Shell much depressed, with the areolæ of the dorsal shields only slightly impressed. Inner extremities of humero-pectoral sulcus extending horizontally across the plastron. Preaxillary and post-inguinal portions of the plastron short; xiphiplastrals apparently not notched.

In the slight areolation of its dorsal shields this species agrees with the existing South-African *H. signatus*. Its resemblance to that species and *H. areolatus* was pointed out by its original describer, who seems to have been deterred from referring it to the same genus from the nature of the deposit in which the type specimen was found.

*Hab.* Europe (England).

**37210.** (*Fig.*) The shell, wanting most of the marginals, and otherwise imperfect; from the London Clay (Lower Eocene) of the Isle of Sheppey. The type specimen; figured by Bell in the 'Reptilia of the London Clay, &c.' vol. i. pt. i. pl. xx. The short postero-lateral surfaces of the 1st and 2nd neurals, although not shown in the figure, are distinctly visible; and the remaining neurals, together with the costals, have the same contour as in the existing forms. The axillary and inguinal buttresses are preserved, and on the right side the axillary one (although not shown in the figure of the anterior aspect) is seen to extend upwards as far as the border of the first costal in the same manner as in existing types. The characters of the plastron are well shown in the plate. *Bell Collection. Purchased*, 1863.

## Genus **STYLEMYS,** Leidy [3].

Shell with the general characters of *Testudo*, but with all, or nearly all, the neural bones hexagonal, with short antero-lateral surfaces; the nuchal not emarginate; the posterior costals not alternating in length; epiplastrals not produced, with one notch at the gulo-pectoral sulcus, and the xiphiplastrals not notched. Skull unknown. The caudal shield is undivided. The entoplastral is generally narrow and pointed anteriorly.

[1] Owen and Bell, 'Reptilia of the London Clay,' &c. (Mon. Pal. Soc.), vol. i. pt. i. p. 71 (1849).—*Emys*. [2] *Loc. cit.*

[3] Proc. Ac. Nat. Sci. Philad. for 1851, p. 173.

### Stylemys nebrascensis, Leidy[1].

Syn. *Testudo nebrascensis*, Leidy[2].
*Testudo hemisphærica*, *T. oweni*, et *T. lata*, Leidy[3].

The type species. Carapace much depressed, with all the neurals hexagonal; vertebral shields not wider than costals. Length of shell averaging 0,305 to 0,406 (12–16 inches). The whole of the above-mentioned forms are identified by their describer with this species. *Stylemys culbertsoni* (Leidy[4]), which is also regarded by the same writer as indistinguishable, has the 2nd neural octagonal, and the 3rd small and approximating to a tetragonal form.

*Hab.* North America.

29676. The imperfect shell; from the Miocene of the White River, Nebraska. The carapace is broken off across the middle of the 4th vertebral shield, and the greater part of the xiphiplastrals is also wanting. This specimen agrees closely with the type shell figured by Leidy in the 'Smiths. Contrib. Knowl.' vol. vi. art. 7, pl. xix. The contour of the neural bones is, however, not shown.
*Purchased*, 1855.

### Stylemys, sp.

Very imperfectly known, but apparently closely allied to the American forms. This species is probably identical with one of the insufficiently described Tortoises recorded by Lartet[5] from Sansan under the names of *Testudo canetotiana*, *T. frizaciana*, and *T. pygmæa*.

*Hab.* Europe (France).

21873. The anterior extremity of the shell, with the carapace crushed; from the Middle Miocene of Sansan (Gers), France. The portion of the carapace shows part of the nuchal, the anterior marginals, and part of the 1st costals. The plastron is entire in advance of the suture between the hyo- and hypoplastrals. The contour of the plastron agrees so closely with that of *Stylemys*, as exemplified in

[1] Proc. Ac. Nat. Sci. Philad. for 1851, p. 173. [2] *Ibid.* for 1852, p. 59.
[3] See Smiths. Contrib. Knowl. vol. vi. art. 7, pp. 105–110 (1854), and Rep. U. S. Geol. Surv. Terrs. vol. i. pt. i. p. 339 (1873). The names date from 1851.
[4] See Smiths. Contrib. Knowl. *op. cit.* pl. xxii., and Rep. U. S. Geol. Surv. Terrs. *l. c.*
[5] See Gervais, Zool. et Pal. Françaises, 2nd ed. p. 437.

the specimen figured by Leidy in the 'Smiths. Contrib. Knowl.' vol. vi. art. 7, pl. xx. (as *Testudo hemisphærica*), that there can be little doubt as to the generic identity of the two forms. This is especially shown in the uninterrupted contour of the anterior border of the epiplastrals, and the contour of the entoplastral. The thickening of the epiplastrals characteristic of the land-tortoises is well shown. *Croizet Collection. Purchased*, 1848.

**40771.** A nuchal bone, probably referable to the same form as the preceding; from Sansan. There is a distinct nuchal shield, and the absence of emargination of the anterior border is well shown. The thickening of the under surface shows that the specimen belongs to a land-tortoise. *Presented by C. Falconer, Esq.*, 1867.

## Genus **PTYCHOGASTER,** Pomel[1].

Neural bones short, and comprising an alternation of smaller tetragonal and larger octagonal ones[2]; costals alternately long and short at their inner and outer extremities; nuchal emarginate. Hyoplastrals united to the carapace by suture, with the axillary buttress extending halfway across the 1st costal; hypoplastrals joining the carapace by a straight ligamentous union, and movable upon a transverse hinge; entoplastral cut by humero-pectoral sulcus (fig. 18), epiplastrals somewhat thickened; xiphiplastrals without distinct notch. Vertebral shields hexagonal and of moderate width; pectorals short antero-posteriorly.

### **Ptychogaster emydoides,** Pomel[3].

The type species. Shell moderately vaulted, long, and narrow; the neurals smooth in the adult, but more or less distinctly carinated in the young. Thickened rim of epiplastrals without distinct median prominence. Length about 0,280 (11 inches).

It may be observed that in this and the following forms the bones of the shell anchylose more or less completely together in the adult.

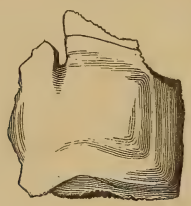
*Hab.* Europe (France).

[1] Bull. Soc. Géol. France, sér. 2, vol. iv. p. 383 (1847).
[2] See Gervais, Zool. et Pal. Françaises, 2nd ed. pl. liii. fig. 5.
[3] *Oc. cit.* p. 385.

*The following specimens are from the Lower Miocene (Upper Oligocene), and, unless the contrary is stated, are from St. Gérand-le-Puy (Allier), France.*

**41097.** The imperfect carapace of an adult individual with the hyoplastrals and the left epiplastral in position; from Aix in Provence. The missing portions of the carapace have been restored in plaster. The contour of the anterior shields of the carapace is shown; but the bones of the plastron and carapace are completely anchylosed together. *Purchased*, 1868.

Fig. 18.



*Ptychogaster emydoides.*—The right hyoplastral; from the Lower Miocene of St. Gérand-le-Puy. $\frac{1}{3}$.

**30944.** The imperfect shell of a smaller individual, restored in plaster. Only the 1st and 2nd neural bones of the carapace are preserved, which agree with those of the specimen figured by Gervais in his 'Zool. et Pal. Françaises,' 2nd ed. pl. liii. fig. 5. The alternation in the length of the costals at their proximal and distal extremities is clearly shown. The anterior extremity of the plastron is wanting, but the posterior half is entire.

*Bravard Collection. Purchased*, 1852.

**30910.** Fragments of the plastron, with a plaster restoration of the missing portions. There is a fragment of the conjoint hyo- and epiplastrals of the right side, which shows the great thickness of the latter bones. *Bravard Collection.*

**26652.** (*Fig.*) The right hyoplastral of an immature individual. Figured in the accompanying woodcut (fig. 18). No anchylosis had taken place with the adjacent bones.

*Pomel Collection. Purchased*, 1851.

**26652 a.** A nearly similar right hyoplastral, with the inner border imperfect. *Pomel Collection.*

**30920.** The left hyoplastral of a younger individual. The buttress is entire. *Bravard Collection.*

**26652 b.** The two hypoplastrals and the imperfect right xiphiplastral of an immature individual. *Pomel Collection.*

**26652 c.** The right hypoplastral of a smaller individual. *Pomel Collection.*

**R. 1583.** A nearly similar right hypoplastral. *No history.*

**R. 1584.** A similar left hypoplastral. *No history.*

**30921.** A smaller left hypoplastral, wanting the antero-external angle. *Bravard Collection.*

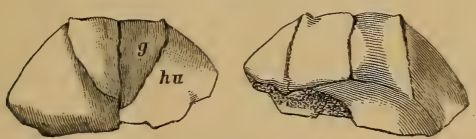
**30931.** Fragment of a similar right hypoplastral. *Bravard Collection.*

**30935.** A first left costal probably referable to an immature individual of this species. The surface for the attachment of the axillary buttress is shown. *Bravard Collection.*

### **Ptychogaster pomeli,** Lydekker, n. sp.[1]

Considerably smaller than the preceding, with the epiplastrals less thickened anteriorly; upper surface of thickened portion of epiplastrals elongated antero-posteriorly, and without median prominence. Gular shields long and narrow.

Fig. 19.




*Ptychogaster pomeli.*—Anterior extremity of the plastron, viewed from the ventral and dorsal aspects; from the Lower Miocene of St. Gérand-le-Puy. ½. *g*, gular; *hu*, humeral shield.

The anchylosis of the component bones in the typical specimen indicates that this form cannot be the young of the type species.

*Hab.* Europe (France).

[1] The names *P. vandenheckii* and *P. abbreviata* applied by Pomel (Catalogue Méthodique, p. 121, 1853) are not sufficiently defined to admit of comparison, but the former indicates a larger species than *P. emydoides*.

**30936.** (*Fig.*) The conjoint epiplastrals, imperfect posteriorly; from the Lower Miocene (Upper Oligocene) of St. Gérand-le-Puy (Allier), France. The type specimen (fig. 19). The two bones are completely anchylosed together, and the anterior part of the epiplastral must also be included in the specimen, although its boundaries are not visible.

*Bravard Collection. Purchased*, 1852.

**30928.** The conjoint epiplastrals, wanting part of the right half and the posterior portion; from St. Gérand-le-Puy.

*Bravard Collection.*

**30918–9.** An apparently associated right hyoplastral and left hypoplastral not improbably referable to this species; from St. Gérand-le-Puy. The contour of the hyoplastral differs somewhat from that of the type species.

*Bravard Collection.*

### **Ptychogaster (?) cayluxensis,** Lydekker, n. sp.

Agreeing approximately in size with the preceding species, but the upper surface of the thickened portion of the epiplastrals much shorter antero-posteriorly, with a distinct median prominence. Gular shields short and wide.

*Hab.* Europe (France).

Fig. 20.

*Ptychogaster* (?) *cayluxensis.*—The anterior extremity of the plastron; from the Phosphorites of Central France. ½. *g*, gular, *hu*, humeral, *pec*, pectoral shield.

**R. 1302.** (*Fig.*) The anterior extremity of the plastron; from the Upper Eocene (Lower Oligocene) Phosphorites of Bach (Lot), France. The type specimen (fig. 20). The epiplastrals and entoplastral are completely fused together, although the outline of the latter bone can be traced.

*By exchange*, 1888.

## Genus **NICORIA**, Gray [1].

Syn. *Rhinoclemmys*, Gray [2].
*Melanochelys*, Gray [3].
*Chaibassia*, Theobald [4].

Neural bones mostly hexagonal, with short postero-lateral surfaces, or alternately tetragonal and octagonal. Plastron extensively united to the carapace by suture, with short axillary and inguinal buttresses, respectively just reaching the 1st and 5th costals; entoplastral intersected by the humero-pectoral sulcus; xiphiplastrals notched. Skull with a bony temporal arcade; no oral ridge on palate; posterior nares on transverse line of orbits. Vertebral shields hexagonal, and generally comparatively narrow. The digits may or may not be webbed.

A recent comparison by the writer of specimens of the forms described as *Chaibassia tricarinata* and *C. theobaldi* [5] shows that both are specifically the same, and also that they are not generically separable from *Nicoria*, of which they indicate a terrestrial species holding the same position in the Oriental tricarinate group [6] as is occupied by *N. annulata* in the Neotropical unicarinate group. It also appears that the ligamentous joint found between the hypoplastrals and carapace of some specimens of *N. tricarinata* is a purely individual character.

### Nicoria tricarinata (Blyth [7]).

Syn. *Geoemyda tricarinata*, Blyth [8].
*Chaibassia tricarinata*, Theobald [9].
*Chaibassia theobaldi*, Anderson [10].

The type of *Chaibassia*.

Carapace elongately oval, somewhat vaulted, with a sudden descent from the vertex to the posterior margin, and tricarinate. Vertebral shields as broad as or broader than long (with the

[1] Catalogue of Shield Reptiles, pt. i. p. 17 (1855).
[2] Ann. Mag. Nat. Hist. ser. 3, vol. xii. p. 182 (1863).
[3] Proc. Zool. Soc. 1869, p. 187.
[4] Catalogue of Reptiles of British India, p. 6 (1876).
[5] These specimens are in the Indian Museum, Calcutta, and will be described by the writer in the 'Journ. As. Soc. Bengal.'
[6] See Boulenger, Catalogue of Chelonians, &c. p. 119.
[7] Journ. As. Soc. Bengal, vol. xxiv. p. 714 (1856).—*Geoemyda.*
[8] *Loc. cit.* [9] Catalogue of Reptiles of British India, p. 6 (1876).
[10] Zoological Results of Yunan Expeditions, p. 718 (1878).

exception in some cases of the first), and much narrower than the costals; nuchal long and narrow. Plastron moderately large; the width of the bridge considerably exceeding that of the posterior lobe, which is broadly notched; in some cases a ligamentous union between the hypoplastrals and carapace. Digits without distinct web.

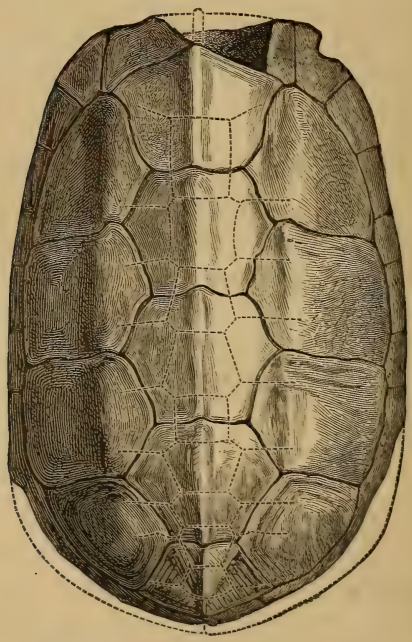
Length of carapace 0,130 to 0,150.

*Hab.* India (Bengal and Assam).

### Var. **sivalensis.**

Larger than the type, attaining a length of 0,178; the first and second vertebral shields relatively wider, and all the vertebrals tending to assume a more decided balloon-shape.

Fig. 21.



*Nicoria tricarinata*, var. *sivalensis*.—The carapace; from the Pliocene of the Siwalik Hills. $\frac{1}{2}$.

**39839.** (*Fig.*) The imperfect shell; from the Pliocene of the Siwalik Hills. The type of the variety; described and figured by the writer in the 'Palæontologia Indica' (Mem. Geol. Surv.

Ind.), ser. 10, vol. iii. p. 176, pl. xxi. figs. 4, 4 *a*, 4 *b*, as a form allied to *Nicoria* (*Clemmys*) *trijuga*. The posterior lobe of the plastron is wanting, and (as is shown by a recent clearing of the matrix) the hypoplastrals were joined to the carapace by a ligamentous attachment, as is the case in some recent examples. The sutures between the bones of the carapace are completely obliterated, as is the case in a recent example showing a similar relation of the hypoplastrals to the carapace. In the woodcut the contour of the neurals has been restored in outline from *Nicoria trijuga*. *Cautley Collection. Presented*, 1840.

## Genus **PALÆOCHELYS**, Meyer[1].

Neural bones of moderate length, the 1st oblong, the 2nd hexagonal with short antero-lateral surfaces, the 3rd octagonal, the 4th tetragonal, the 5th octagonal. Plastron extensively united to the carapace by suture, with strong axillary and inguinal buttresses; sulcus between humeral and pectoral shields cutting entoplastral bone.

The Chelonian from the Lower Pliocene (Astien) of Piedmont described by Sacco in the 'Mem. Ac. R. Torino,' vol. xxxix. p. 433, pls. i., ii. (1889), as *Emys portisi* belongs to this genus, and shows the characters of the plastron.

This genus is readily distinguished from *Nicoria* and the Land-Tortoises in that the octagonal neural bones are the 3rd and 5th in place of the 2nd and 4th (compare fig. 12). *Ptychogaster* agrees with the Land-Tortoises in this respect.

### **Palæochelys bussenensis**, Meyer[2].

The type species. Carapace with a very slight and discontinuous median keel in the posterior region; vertebral shields relatively wide. Plastron imperfectly known. Length of type carapace about 0,280 (11 inches).

*Hab.* Europe (Germany).

**R. 1012.** (*Fig.*) Slab showing the dorsal aspect of the crushed shell; from the Lower Miocene (Upper Oligocene), near Bussen, Würtemberg. The type specimen; described and figured by Meyer in the 'Jahresh. Ver. Nat. Württ.' vol. iii. p. 167, pl. i. fig. 11. In the original figure, the sulci indicating the boundaries of the epidermal shields are no shown.

[1] Jahresh. Ver. Nat. Württ. vol. iii. p. 167 (1847).

[2] *Loc. cit.*

Nearly the whole of the carapace remains, but the 5th and 6th costals have been cut away on the right side in order to exhibit the dorsal aspect of the hypoplastral. The inguinal buttress is thus seen to occupy precisely the same relative position as in *Ocadia*. The pygal and suprapygal bones, as well as the vertebral shields, agree very closely in contour with those of the latter; but the form of the neurals is quite different. *Purchased.*

Genus *non det.*

The undermentioned specimen differs from the epiplastrals of the following genera in the presence of a thickened ridge on the outer half of the dorsal surface occupied by the gular shield, and thereby agrees with the corresponding bone of *Nicoria*, to which genus it may belong, or it may be referable to *Palæochelys*.

*Hab.* Europe (England).

**R. 1582.** The right epiplastral bone; from the Upper Eocene (Lower Oligocene) of Hordwell, Hampshire.

*Hastings Collection. Purchased,* 1855.

## Genus **EMYS,** Duméril[1].

Syn. *Lutremys,* Gray[2].

Neural bones short, hexagonal, with the antero-lateral surfaces much shorter than the postero-lateral; nuchal not distinctly emarginate. Plastron united to the carapace by ligament, and in the adult more or less distinctly divided into two lobes movable upon a ligamentous hinge situated between the hyo- and hypoplastrals, both of which enter into the formation of the bridge; entoplastral cut by the humero-pectoral sulcus; xiphiplastrals not distinctly notched. Skull without oral palatal ridges. The vertebral shields are hexagonal and of moderate width.

In this and the following genera the costal bones do not alternate in length at their extremities; the epiplastrals are not distinctly thickened anteriorly; and the sulcus between the marginal and costal shields is placed entirely on the costal bones.

None of the extinct species referred to this genus appear really to belong to it, in the sense in which the term is now employed.

[1] Zoologie Analytique, p. 76 (1806).

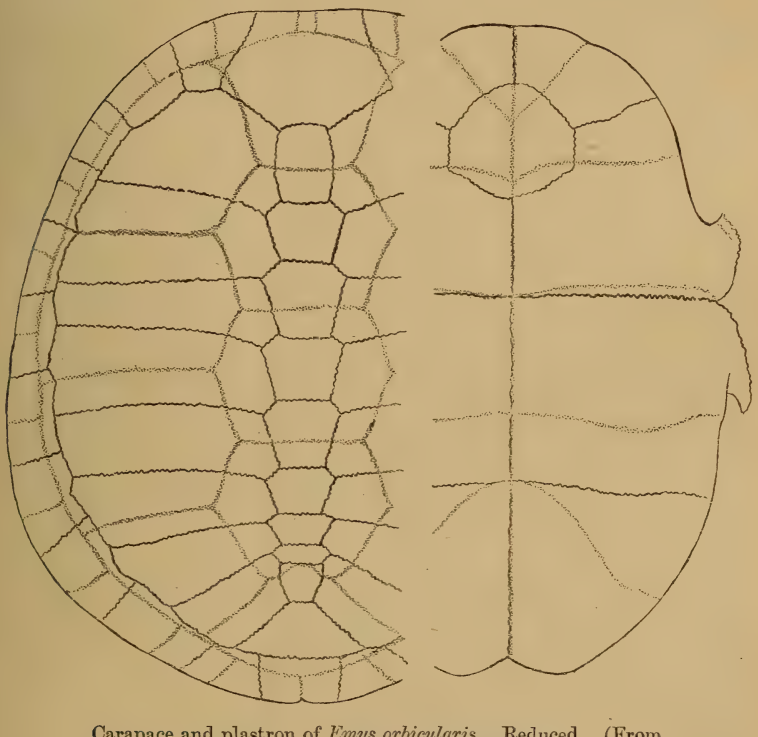
[2] Catalogue of Tortoises, p. 31 (1844).

## Emys orbicularis (Linn.[1]).

Syn. *Testudo orbicularis*, Linn.[2].
*Emys lutaria*, Schneider[3].
*Emys europæa*, Schneider[4].
*Cistudo europæa*, Gray[5].
*Emys turfa*, Meyer[6].
*Lutremys europæa*, Gray[7].

The type species. Carapace (fig. 22) short and ovoid, broadest posteriorly. Nuchal shield small and narrow; 1st vertebral shield

Fig. 22.



Carapace and plastron of *Emys orbicularis*. Reduced. (From Boulenger's 'Catalogue of Chelonians.')

[1] Syst. Nat. ed. 12, vol. i. p. 351 (1766). *Testudo*. [2] *Loc. cit.*
[3] Schildkroten, p. 323 (1783). [4] *Ibid.* p. 338.
[5] Synopsis Reptilium, p. 19 (1831).
[6] Neues Jahrb. 1835, p. 67.
[7] Catalogue of Shield Reptiles, pt. i. p. 40 (1855).

broadest in front; middle vertebrals broader than long. Plastron relatively large, but not entirely closing the carapace; bridge formed to a larger extent by the hypo- than by the hyoplastral.

Average length of shell of adult 0,190 (7·5 inches).

For complete synonymy see Boulenger's 'Catalogue of Chelonians, &c.' p. 112.

*Hab.* Europe, S.W. Asia, and Algeria. In the Pleistocene the range of this species in Europe was much more northerly than at the present day, its remains having been obtained from the Pleistocene of Mundesley.

**43001.** The carapace; from the Pleistocene of Ghent, Belgium. Mentioned by E. T. Newton in the 'Geol. Mag.' dec. ii. vol. vi. p. 305. The pygal is wanting. This specimen is adult, and is but slightly expanded posteriorly.

*Van Breda Collection. Purchased*, 1871.

**43000.** Cast of the entire shell of a smaller individual. The original was obtained in the Vosges from beds which are probably of Pleistocene age. The hinder part of the carapace is much expanded. The specimen is abnormal in having five regular costal shields on the left side, an imperfect fifth one also occurring on the right.

*Van Breda Collection.*

**49340.** A number of imperfect costal bones; from the Pleistocene of Zebbug Cave, Malta. Among these specimens one (*a*) is the proximal portion of the 3rd of the right side; another (*b*) is the distal part of the 2nd of the left side; another (*c*) the distal part of the 4th of the left side; and a fourth (*d*) the distal half of the 5th of the left side.

*Presented by Admiral Spratt, C.B.*, 1875.

**49341.** (*Fig.*) The right femur; from Zebbug Cave. Figured by Leith Adams in the 'Quart. Journ. Geol. Soc.' vol. xxxiii. pl. vi. figs. 5, 5*a*. *Presented by Admiral Spratt, C.B.*, 1875.

## Genus **DAMONIA**, Gray[1].

Neural bones of moderate length, hexagonal, carinate, with short antero-lateral surfaces. Plastron extensively united with the carapace by suture, with moderately long buttresses, which extend on to the costals, and of which the inguinal is usually wedged in between

[1] Proc. Zool. Soc. 1869, p. 193.

the 5th and 6th costals; entoplastral bone cut by the sulcus dividing the humeral and pectoral shields. Xiphiplastrals notched.

The vertebral shields are hexagonal and elongated in the adult; a nuchal shield is nearly always present; and the palate has no median ridge on the oral surface of the maxillæ.

### Damonia hamiltoni, Gray[1].

Syn. *Emys hamiltoni*, Gray[2].
*Clemmys hamiltoni*, Strauch[3].
*Clemmys palæindica*, Lydekker[4].

The type species. Carapace much vaulted, with three interrupted nodose keels; posterior border serrated; nuchal shield narrowing in front; 1st vertebral usually not wider in front than behind. Plastron large, angulated laterally, and truncated anteriorly, with the postinguinal portion long, narrow, and deeply notched.

It appears that the fossil specimens described as *Clemmys palæindica* are not specifically separable, although they attain larger dimensions than the living examples, in which the length of the carapace reaches 0,220 (8·7 inches).

*Hab.* India (Bengal, Punjab, and Sind).

**39840.** (*Fig.*) An immature shell, imperfect posteriorly; from the Pliocene of the Siwalik Hills. Figured by the writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pl. xxi. figs. 1, 1*a*, 1*b* (as *C. palæindica*).
*Cautley Collection. Presented*, 1840.

**39838.** (*Fig.*) The shell of an adult individual; from the Siwalik Hills. Figured by the writer, *op. cit.* pl. xxi. figs. 3, 3*a* (as *C. palæindica*). *Cautley Collection.*

**R. 887.** The anterior portion of the shell of a very large individual; from the Siwaliks. The carapace wants the whole of the portion posterior to the middle of the 5th neural, the portion preserved being imperfect on the left side. Both the sutures of the bones and the sulci of the shields are distinctly shown. The plastron shows the imperfect hyo- and hypoplastrals. This specimen is considerably larger than any existing example. *Cautley Collection.*

[1] Synopsis Reptilium, p. 21 (1831).—*Emys.* [2] *Loc. cit.*
[3] Chelonologische Studien, p. 32 (1862).
[4] Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. iii. p. 178 (1885).

**39842.** The crushed shell of an individual agreeing nearly in size with the preceding; from the Siwaliks. The carapace has been crushed in, and many of the component bones are dislocated, although the two extremities remain nearly entire. The plastron, although split in the median line, is entire, and the cutting of the entoplastral by the humero-pectoral sulcus is shown. *Cautley Collection.*

**R. 329.** Fragment of the right side of the shell of an individual very nearly as large as the preceding; from the Siwaliks. The specimen shows the 1st costal, 4 marginals, and portions of the hyo- and hypoplastrals.
*Transferred from the Indian Museum*, 1880.

**R. 829.** The imperfect plastron of a very large individual, in matrix; from the Siwaliks. The epiplastrals are imperfect anteriorly, and only small fragments of the xiphiplastrals remain. The humero-pectoral sulcus is seen cutting the entoplastral. *Cautley Collection.*

**R. 1585.** The 5th and 6th left costals of a young individual, showing the insertion of the inguinal buttress; from the Siwaliks. *Cautley Collection.*

## Genus **BELLIA**, Gray [1].

The shell has the same general structural features as in *Damonia*, but the neural bones of the adult (fig. 23) are not distinctly carinated, and the vertebral shields have a more or less decidedly balloon-shaped contour. The nuchal shield may be absent. The skull is readily distinguished from that of *Damonia* by the forward position of the posterior nares.

### **Bellia sivalensis**, Theobald [2].

Syn. *Clemmys sivalensis*, Lydekker [3].
*Clemmys hydaspica*, Lydekker [4].

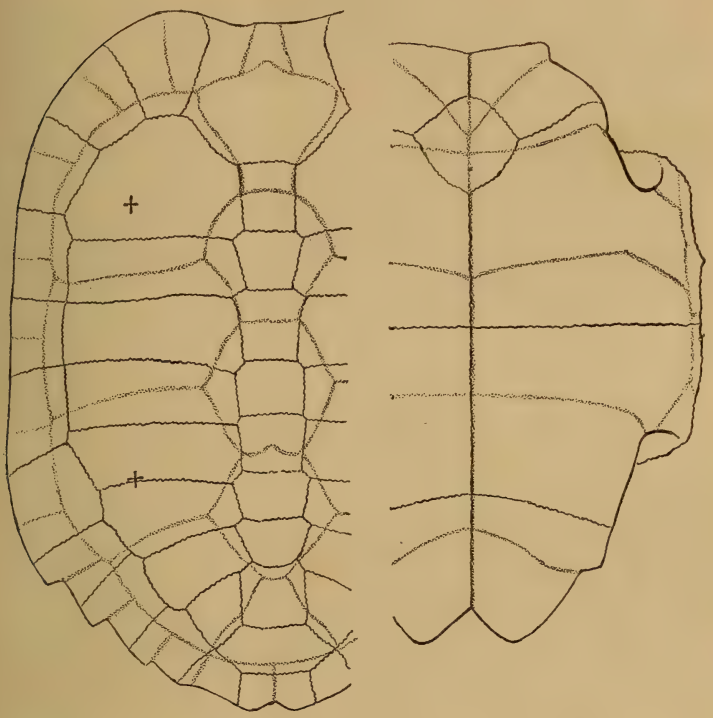
Carapace moderately depressed, without distinct carinæ, and with the vertebral region flattened in the adult male; no nuchal shield; 1st vertebral shield pentagonal, much narrower behind than in front.

[1] Proc. Zool Soc. 1869, p. 197.
[2] Rec. Geol. Surv. Ind. vol. x. p. 44 (1877).
[3] 'Palæontologia Indica' (Mem. Geol. Surv. Ind.), ser. 10, vol. iii. p. 170 (1885).
[4] *Ibid.* p. 172.

*Clemmys hydaspica* appears to be founded on the shell of a female of this species.

*Hab.* India (Punjab).

Fig. 23.



*Bellia crassicollis.*—Carapace and plastron; reduced. The + + show the terminations of the axillary and inguinal buttresses.—(From Boulenger's 'Catalogue of Chelonians.')

**R. 1514.** Cast of the imperfect shell of an adult male. The original, which is the type, was obtained from the Siwaliks of the Punjab, and is preserved in the Indian Museum, Calcutta. It is figured by the writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pl. xx. figs. 1, 1*a*, 1*b*. In the figure the sutures between the bones of the carapace are not indicated, but they can be faintly traced in the original. The flattening of the vertebral region, by which this specimen is distinguished from the female shell represented in fig. 4 of the same plate, is well shown.

*Made in the Museum*, 1889.

### **Bellia theobaldi**, Lydekker[1].

Syn. *Clemmys theobaldi*, Lydekker[2].
*Clemmys punjabiensis*, Lydekker[3].

Distinguished from the preceding by the urn-shaped 1st vertebral shield, which is relatively broad posteriorly. *Clemmys punjabiensis* is founded on a female shell.

*Hab.* India (Punjab).

**R. 1515.** Cast of the imperfect shell of an adult male. The original, which is the type, was obtained from the Pliocene Siwaliks of the Punjab, and is preserved in the Indian Museum, Calcutta. It is figured by the writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pl. xx. figs. 2, 2*a*, 2*b*; the female shell being represented in figs. 3, 3*a*, 3*b* of the same plate. *Made in the Museum*, 1889.

## Genus **OCADIA**, Gray[4].

Neural bones of moderate length, hexagonal, with their antero-lateral surfaces much shorter than the postero-lateral. Plastron extensively united to the carapace by suture, with strong axillary and inguinal buttresses extending on to the costals; sulcus between humeral and pectoral shields either cutting or placed immediately behind the entoplastral bone; xiphiplastrals notched. A nuchal shield is always present, and the vertebrals are hexagonal and comparatively narrow, with a peculiar projection on the middle of the anterior border. The pectoral shield is not greatly shorter than the abdominal. The 2nd suprapygal bone approximates in contour to a truncated cone.

The undermentioned Chelonians appear inseparable from *Ocadia*, now known only by a single species from China, in which the humero-pectoral sulcus always cuts the entoplastral bone. In *Clemmys* the neural bones are still shorter than in *Ocadia*, and the vertebral shields have not the forward projection.

[1] 'Palæontologia Indica' (Mem. Geol. Surv. Ind.), ser. 10, vol. iii. p. 173 (1885).—*Clemmys*.
[2] *Loc. cit.* [3] *Ibid.* p. 175.
[4] Suppl. Cat. Shield Reptiles, pt. i. p. 35 (1870). See Boulenger, 'Cat. of Chelonia,' &c. p. 85, fig. 24 (1889).

**Ocadia (?) nicoleti** (Pictet & Humbert[1]).

Syn. *Emys nicoleti*, Pictet & Humbert[2].

Known only by fragments of the carapace and plastron, the former being the type. In the plastron the humero-pectoral sulcus cuts the entoplastral at a high level, and the antero-posterior diameter of that bone considerably exceeds the transverse. Of small size.

In the absence of any knowledge of the contour of the neural bones of the carapace, the generic position of this species must be regarded as provisional. The entoplastral presents, however, all the characters of *Ocadia*.

*Hab.* Europe (Switzerland).

The originals of the following specimens are the types, and were obtained from the Middle Miocene of Chaux-de-Fonds, Switzerland.

**R. 1517.** Cast of a marginal bone. Figured by Pictet and Humbert in their 'Matériaux pour la Paléontologie Suisse—Chéloniens de la Molasse,' pl. xiv. fig. 7.
*Egerton Collection. Purchased*, 1882.

**R. 1517 a.** Cast of a marginal. Figured, *op. cit.* pl. xiv. fig. 9.
*Egerton Collection.*

**R. 1518.** Cast of the right epiplastral. Figured, *op. cit.* pl. xv. (*b*).
*Egerton Collection.*

**R. 1518 a.** Cast of the entoplastral. Figured, *op. cit.* pl. xv. (*a*).
*Egerton Collection.*

**R. 1518 b.** Cast of the imperfect right hyoplastral. Figured, *op. cit.* pl. xv. (*d*). The figure is drawn the wrong way up, and is referred to the wrong side of the plastron.
*Egerton Collection.*

**R. 1518 c.** Cast of a fragment of the right hypoplastral. Figured *op. cit.* pl. xv. (*e*). *Egerton Collection.*

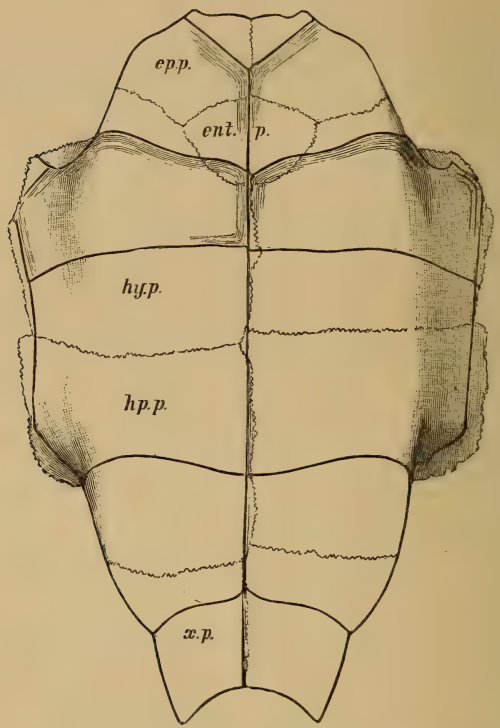
[1] Matériaux pour la Paléontologie Suisse—Chéloniens de la Molasse, p. 42 (1856).—*Emys*.
[2] *Loc. cit.*

## Ocadia crassa (Owen) [1].

Syn. *Emys crassus*, Owen [2].
*Emys hordwellienśis*, Seeley [3].

Of comparatively large size. Humero-pectoral sulcus either cutting entoplastral or confined to hyoplastral; transverse diameter of

Fig. 24.




*Ocadia crassa.*—The plastron; from the Upper Eocene of Hordwell. ⅓. *ep.p*, epiplastral; *ent.p*, entoplastral; *hy.p*, hyoplastral; *hp.p*, hypoplastral; *x.p*, xiphiplastral.

entoplastral considerably exceeding the vertical (fig. 24); hypoplastrals and xiphiplastrals short; xiphiplastral cornua pointed, and borders of intervening notch emarginate; femoral shield short.

As shown below, there are no characters by which the type

[1] Reptilia of London Clay, &c. (Mon. Pal. Soc.), vol. i. pt. i. p. 76 (1849).—*Emys*.
[2] *Loc. cit.*
[3] Quart. Journ. Geol. Soc. vol. xxxii. p. 445 (1876).

plastron of *Emys hordwelliensis* can be specifically distinguished from that of *E. crassa*, both specimens having the humero-pectoral sulcus confined to the hyoplastral. Those specimens in which this sulcus cuts the entoplastral can scarcely be specifically separated on this ground alone.

*Hab.* Europe (England and France).

*The following specimens are from the Upper Eocene (Lower Oligocene) of Hordwell, Hampshire.*

**32349.** (*Fig.*) The nearly entire carapace and plastron of an immature individual. In the carapace the nuchal, pygal, suprapygals, and some of the marginal bones are wanting, and have been restored in plaster. The plastron (fig. 24) is now nearly entire, although it was originally broken into a number of fragments. The gular shields are of great relative width; the entoplastral is wide, and traversed by the humero-pectoral sulcus, and the hyoplastrals resemble No. 30410 *e*. The xiphiplastrals are short, with the borders of the notch emarginate; the length of the femoral shield is 0,056 (2·15 inches).

*Hastings Collection. Purchased*, 1855.

**32349 x.** The posterior extremity of a carapace closely resembling the preceding specimen, and probably referable to the same species. The pygal and suprapygal region is well preserved, and a large number of the marginals, as well as portions of many of the costals of the left side, are shown. *Hastings Collection.*

**R. 1561.** Portions of the carapace and plastron of an individual agreeing in size with the preceding. The portion of the carapace comprises the 4th, 5th, and 6th neurals, the 3rd, 4th, and 5th costals of the left side, and the 5th and 6th of the right, together with three marginals on the left and two on the right side. These bones agree almost exactly in size and contour with the corresponding ones of the specimen described as *Emys hordwelliensis*. There are some detached marginals. The fragments of the plastron comprise the greater portions of the two hypoplastrals and small remnants of the hyo- and xiphiplastrals. The hypoplastrals are of the short form characteristic of the present species. *Hastings Collection.*

**38102.** (*Fig.*) The right epiplastral of an adult individual, probably referable to this species. Figured by Owen, *op. cit.* pl. xxxvi. fig. 5 (without name), as a posterior marginal. In the absence of any distinct elevation of that part of the dorsal surface which is covered by shields above the general surface, this specimen agrees with the existing *Ocadia*. The specimen indicates a slightly smaller individual than that to which the type hyoplastral belonged. *Hastings Collection.*

**R. 1573.** A left epiplastral, agreeing in size with the preceding. *Hastings Collection.*

**R. 1574.** A right epiplastral, of nearly the same size. The surface for the hyoplastral is unusually short, and the specimen may belong to the next species. *Hastings Collection.*

**R. 1575.** The entoplastral. This specimen agrees with the entoplastral of No. 32349 in being traversed by the humero-pectoral sulcus, and thereby differs from the corresponding bone of the type of *Emys hordwelliensis*. *Hastings Collection.*

**R. 1576.** An entoplastral which appears to have been flattened by pressure. The humero-pectoral sulcus in this specimen only just impinges on the inferior angle, thus showing that very little importance can be attached to its position. *Hastings Collection.*

**30410 a.** (*Fig.*) The right hyoplastral of an adult individual. The type specimen; figured by Owen in his 'Reptilia of the London Clay, &c.' vol. i. pl. xxvii. fig. 1, reversed (incorrectly termed the left hyposternal in the description of the plate). This specimen is mentioned by Seeley on p. 450 of vol. xxxii. of the 'Quart. Journ. Geol. Soc.,' where it is stated to differ in the contour of the anterior extremity and the position of the sulci from the corresponding bone of the type plastron of *Emys hordwelliensis*, figured on p. 449 of the same volume. A comparison with the figure shows, however, that the two specimens are practically identical in these respects. In both the humero-pectoral sulcus does not impinge on to the entoplastral. The relative width of the latter bone in the present example is shown by the contour of its notch. *Hastings Collection.*

**R. 1580.** A smaller and imperfect left hyoplastral. The antero-external angle is wanting, but the entire humero-pectoral sulcus is shown, and is seen to be confined to this bone.
*Hastings Collection.*

**30410 e.** The right hyoplastral of an immature individual. This specimen agrees in size with the corresponding bone of No. 32349, and shows that the humero-pectoral sulcus traversed the entoplastral, as in that specimen.
*Hastings Collection.*

**R. 1577.** A nearly similar right hyoplastral. In this specimen the humero-pectoral sulcus would have cut the entoplastral at a higher level than in the preceding specimen.
*Hastings Collection.*

**R. 1581.** Fragment of a right hypoplastral, agreeing in relative size with the type specimen, and therefore probably referable to this species. *Hastings Collection.*

**30410 f.** The left hypoplastral. This specimen agrees with the hypoplastral of No. 32349 in dimensions, its length being 0,085 (3·36 inches), and its width at the inguinal notch 0,065 (2·55 inches). It is much shorter than in *O. oweni*.
*Hastings Collection.*

**R. 1578.** A right hypoplastral of similar type. *Hastings Collection.*

**R. 1578 a.** A smaller right hypoplastral of the same type.
*Hastings Collection.*

**R. 1579.** The two associated xiphiplastrals of an individual agreeing in size with No. 32349. The form of the notch is nearly the same as in the latter, and differs widely from that in the type of *O. oweni*. *Hastings Collection.*

*The following specimen is from the Upper Eocene (Lower Oligocene) of Apt, near Débruge (Vaucluse), France.*

**26651 x.** The imperfect left hyoplastral of a young individual. This specimen agrees closely in size with the type plastron of *O. oweni*, but differs in the contour of the notch for the entoplastral, which is thus shown to have had the wide contour characteristic of the present species.
*Bravard Collection. Purchased*, 1852.

Specimens of which some may belong to the next species.

a. *From the Upper Eocene (Lower Oligocene) of Hordwell.*

**30410 g.** The nuchal bone of an adult specimen. This specimen, which was probably associated with the type hyoplastral, agrees in all respects with the nuchal of the type of *Emys hordwelliensis* figured by Seeley in the 'Quart. Journ. Geol. Soc.' vol. xxxii. p. 446, fig. 1, but is of rather larger size. It closely resembles the nuchal of *Ocadia sinensis*.
*Hastings Collection.*

**38100.** (*Fig.*) An immature nuchal. Figured by Owen in his 'Reptilia of the London Clay, &c.' vol. i. pt. i. pl. xxiv. fig. 1, without name[1]. In contour it agrees precisely with the preceding specimen, while in size it accords with the 1st margnial of No. R. 1562. *Hastings Collection.*

**R. 1563.** A nuchal agreeing in size with the preceding specimen. The dorsal part of the nuchal shield is very narrow.
*Hastings Collection.*

**R. 1560.** A series of eight neural bones and the anterior suprapygal, belonging to different individuals. These bones are lettered consecutively *a* to *h*, according to their serial position. They agree precisely with the corresponding bones of the type of *Emys hordwelliensis*, and also closely resemble those of the existing *Ocadia*. The prominence in the anterior sulci of the vertebral shields is well shown on the 1st, 3rd, 5th, and 8th neurals.
*Hastings Collection.*

**R. 1571.** Numerous specimens of the 1st neural bone.
*Hastings Collection.*

**R. 1572.** Several specimens of neurals, of which the majority are the 2nd of the series. *Hastings Collection.*

**R. 1566.** Numerous specimens of neurals, the majority of which are the 3rd of the series. *Hastings Collection.*

**38101.** (*Fig.*) A 3rd or 5th neural (probably 3rd). Figured by Owen, *op. cit.* pl. xxiv. figs. 2, 3, without name, and in a reversed position. *Hastings Collection.*

[1] The name *Emys testudiniformis* in the description of the plate is erroneously made to include this and the undermentioned specimens figured in the same plate.

**R. 1567.** Numerous neurals, most of which are the 4th of the series. *Hastings Collection.*

**R. 1568.** Numerous specimens of the 5th neural. *Hastings Collection.*

**R. 1569.** Several specimens of the 6th neural. *Hastings Collection.*

**R. 1570.** Numerous examples of the 8th neural. *Hastings Collection.*

**33198.** The pygal bone of an adult individual. This specimen was not improbably associated with the nuchal No. 30410 *g*. The sulcus between the last vertebral and the caudal shields was situated on the suprapygal, as in *Ocadia*; in *Palæochelys bussenensis* the middle of this sulcus impinges on to the pygal. *Hastings Collection.*

b. *From the Upper Eocene (Lower Oligocene) of Vaucluse.*

*All the following belong to the Bravard Collection. Purchased*, 1852.

**26651 c.** The nuchal of a comparatively small individual.

**26651 d.** The anterior portion of a similar nuchal.

**26651 e.** The first neural of a large individual.

**26651 f.** A right epiplastral. This specimen is remarkable for the extreme width of the gular shield.

**26651 g.** A left epiplastral. Agrees in size with the preceding specimen, but has a narrower intergular.

**26651 h.** A smaller right epiplastral.

**26651 i.** A left epiplastral, agreeing nearly in size with the preceding specimen.

**26651 k.** Part of the left hyoplastral and the entire hypoplastral of the same side, in matrix.

**26651 l.** The imperfect right hypoplastral.

**Ocadia oweni,** Lydekker, n. sp.

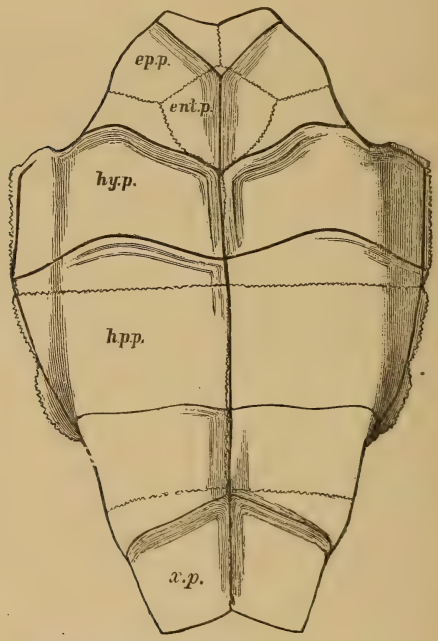
Humero-pectoral sulcus confined to the hyoplastral; antero-posterior and transverse diameters of entoplastral nearly equal (fig. 25); hypo- and xiphiplastrals long; xiphiplastral cornua angulated, and the borders of the intervening notch not emarginate. Femoral shield long.

The French specimens of this and the preceding species show that the difference in the contour of the entoplastral is not dependent on differences of age.

*Hab.* Europe (England and France).

**36811.** (*Fig.*) Portions of the carapace and plastron of a young individual; from the Upper Eocene (Lower Oligocene) of Hordwell, Hampshire. The type specimen. The portion of the carapace comprises the 4th neural, and the 3rd, 4th, 5th, and 6th costals of the right side. The plastron is shown in fig. 25, with a restoration of the missing portions. The entoplastral is as long as broad, and thus resembles *Ocadia*

Fig. 25.




*Ocadia oweni.*—The plastron; from the Upper Eocene of Hordwell. ⅔. *ep.p*, epiplastral; *ent.p*, entoplastral; *hy.p*, hyoplastral; *hp.p*, hypoplastral; *x.p*, xiphiplastral.

*sinensis*, although distinguished by the humero-pectoral sulcus being entirely on the hyoplastral. The contour of the whole plastron is practically identical with that of the existing *Ocadia*. *Presented by S. Laing, Esq.*, 1862.

**R. 1562.** Portions of the carapace of a young individual of a species of this genus agreeing closely in size with the preceding specimen, and perhaps referable to the same species; from Hordwell. The fragments comprise the 3rd, 4th, 5th, and 6th costals of the left, the 2nd costal of the right side, the 6th neural, the two suprapygals, portions of the 7th and 8th costals of the right side, and several marginals. The marginals include the 1st and 2nd of the right side. All the bones closely resemble those of *Ocadia sinensis*.

*Hastings Collection. Purchased*, 1855.

**30410 b.** The imperfect right hypo- and xiphiplastrals of a much larger individual; from Hordwell. This specimen indicates an individual agreeing approximately in size with *P. crassa*, No. 32349; but the proportions are different. Thus while the length of the hypoplastral is 0,095 (3·73 inches) and its width 0,068 (2·65 inches), the length of the femoral shield is 0,073 (2·85 inches). The xiphiplastral is unfortunately imperfect at its distal extremity, but it appears to agree closely in contour with the corresponding bone of the type specimen. *Hastings Collection.*

**26651 a.** The crushed shell of a very young individual; from the Upper Eocene of Apt, near Débruge (Vaucluse), France. The carapace has been crushed nearly flat from side to side, but the plastron is fairly well preserved. The neural bones of the carapace, as well as the vertebral shields, are well preserved, and agree closely with those of *Ocadia sinensis*. The antero-posterior elongation of the entoplastral is well shown; and the humero-pectoral sulcus is confined to the hyoplastral. The right hyoplastral has been squeezed partially over the entoplastral.

*Bravard Collection. Purchased*, 1852.

**26651 b.** The entoplastral of a much larger individual; from Apt. The characteristic contour is well preserved.

*Bravard Collection.*

**26651 m.** The right xiphiplastral; from Apt. This specimen indicates an individual of rather larger size than the type, with the corresponding bone of which it agrees in contour.

*Bravard Collection.*

**26651 n.** A somewhat larger right xiphiplastral, probably referable to this species; from Apt. The postero-internal angle is wanting. *Bravard Collection.*

## Genus **CHRYSEMYS**, Gray [1].

Neural bones of moderate length, with their antero-lateral surfaces much shorter than the postero-lateral. Plastron extensively united to the carapace by suture, with moderately long or short buttresses, of which the inguinal is anchylosed to the 5th costal; humero-pectoral sulcus placed entirely on the hyoplastral and considerably behind the entoplastral bone.

The vertebral shields are hexagonal and elongated; and the pectoral shield is relatively short in proportion to the abdominal. On the palate the oral surfaces of the maxilla are ridged.

In provisionally referring the undermentioned Lower Eocene forms to this genus the writer does so on the grounds that the above-mentioned diagnosis (which in respect of the shell is taken almost exclusively from the fossils) agrees precisely with that of the existing forms. If differences in the cranium be ultimately discovered, then grounds would be available for the generic separation of the Eocene forms.

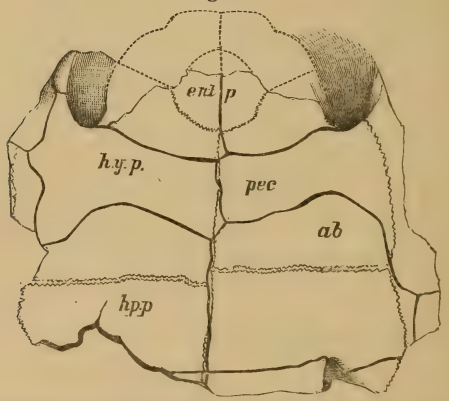
The existing representatives of the genus are exclusively American.

### **Chrysemys testudiniformis** (Owen [2]).

Syn. *Emys testudiniformis*, Owen [3].

Carapace much vaulted, without any trace of costal carinæ. The length of the carapace was probably about 0,305 (12 inches).

Fig. 26.




*Chrysemys testudiniformis.*—The imperfect plastron; from the London Clay of Sheppey. $\frac{1}{3}$. *ent.p*, entoplastral bone; *hy.p*, hyoplastral bone; *hp.p*, hypoplastral bone; *pec*, pectoral shield; *ab*, abdominal shield.

[1] Catalogue of Tortoises in Brit. Mus. p. 27 (1844).

[2] Rep. Brit. Assoc. for 1841, p. 161 (1842).—*Emys.* [3] *Loc. cit.*

Pectoral shield extremely short antero-posteriorly, its length being less than half that of the abdominal.

*Hab.* Europe (England).

39767. (*Fig.*) The imperfect shell; from the London Clay (Lower Eocene) of the Isle of Sheppey. The type specimen. Described by Owen in the 'Rep. Brit. Assoc.' for 1841, p. 162, and figured by him, from the anterior extremity, in his 'Reptilia of the London Clay, &c.,' pl. xxiv. fig. 6 (in the description of the plate the other figures are incorrectly grouped under this name). Of the carapace only portions of the left side are preserved, but these are sufficient to indicate the contour of the neural bones and vertebral shields, which appear to have been very like those of the next species. The plastron, which is imperfect anteriorly and posteriorly, is represented in the accompanying woodcut (fig. 26).

*Bowerbank Collection. Purchased*, 1865.

### **Chrysemys bicarinata** (Bell [1]).

Syn. *Emys bicarinata*, Bell [2].
*Clemmys bicarinata*, Lydekker and Boulenger [3].

Carapace somewhat depressed, with strongly marked costal carinæ. Pectoral shield comparatively long, its length considerably exceeding half that of the abdominal. Fully equal in size to the preceding species.

*Hab.* Europe (England).

39450. (*Fig.*) The imperfect shell; from the London Clay (Lower Eocene) of the Isle of Sheppey. The type specimen. Figured by Bell in the 'Reptilia of the London Clay, &c.' vol. i. pt. i. pls. xxv., xxvi. The neural bones and vertebral shields of the carapace are well shown. The boundaries of most of the plastral shields are also visible, although somewhat indistinct; and the contour of the entoplastral can also be faintly traced.

*Bowerbank Collection. Purchased*, 1865.

### Genus **HARDELLA**, Gray [4].

Shell (fig. 27) with the general characters of the typical group of *Kachuga*, but with the 4th vertebral shield not longer than the 3rd,

[1] Owen & Bell, Reptilia of London Clay, &c. (Mon. Pal. Soc.), vol. i. pt. i. p. 73 (1849).—*Emys*.
[2] *Loc. cit.*
[3] Geol. Mag. decad. 3, vol. iv. p. 275 (1887).
[4] Supplement to Catalogue of Shield Reptiles, pt. i. p. 58 (1870).

and extending over three neural bones. The oral surfaces of the maxillæ are very wide, so that the narial passage is extensively floored, and have a median ridge; while the alveolar edges of the jaws are very strongly serrated.

In this genus the 3rd vertebral shield has its anterior and posterior borders on the 3rd and 5th neural bones; whereas in *Cachuga* (fig. 28) the same borders cut the 3rd and 4th neurals.

### Hardella thurgi, Gray [1].

Syn. *Emys thurgi*, Gray [2].
*Batagur thurgi*, Theobald [3].
*Batagur falconeri*, Lydekker [4].
*Batagur cautleyi*, Lydekker [5].
*Clemmys watsoni*, Lydekker [6].

The type and only known species. Carapace somewhat depressed, with an interrupted nodose carina and entire posterior margin; nuchal shield narrow, widest behind; 1st vertebral usually narrowing in front, with sinuous lateral borders.

Length of shell of recent female 0,450 (17·7 inches), in male much less.

*Hab.* India (Ganges and Indus basins).

**R. 597.** Cast of the slightly imperfect cranium. The original was obtained from the Pliocene Siwaliks of the Punjab, and is preserved in the Indian Museum, Calcutta. It is figured by the writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pl. xxv. figs. 2, 2*a*, as *B. falconeri*.

*Made in the Museum*, 1885.

**39835.** (*Fig.*) The shell of an adult female, imperfect posteriorly, and with the left side of the carapace crushed in; from the Pliocene of the Siwalik hills. Figured by the writer, *op. cit.* pl. xxiii. figs. 1, 1*a*, and pl. xxiv. fig. 4, as *B. falconeri*, of which it is the type. This specimen was only separated specifically from the existing form with great hesitation.

*Cautley Collection. Presented*, 1840.

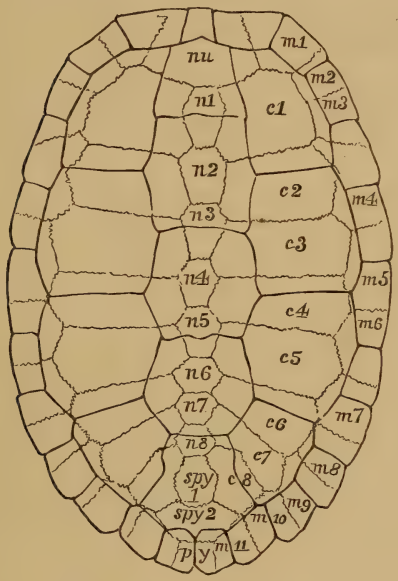
**R. 329.** The crushed and imperfect shell of a subadult female; from the Siwalik Hills. The anterior and posterior ex-

[1] Synopsis Reptilium, p. 22 (1831).—*Emys*. [2] *Loc. cit.*
[3] Catalogue of Reptiles Mus. Asiatic Society of Bengal, p. 12 (1868).
[4] Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. iii. p. 187 (1885).
[5] *Ibid.* p. 194. [6] Quart. Journ. Geol. Soc. vol. xlii. p. 540 (1886).

tremities are wanting, and some of the bones are somewhat dislocated. In contour, as well as in the form of the vertebral shields and their relations to the underlying neural bones, this specimen precisely resembles the preceding one. *Cautley Collection.*

**R. 959.** An imperfect and crushed shell, probably referable to an adult female of this species; from the Siwalik Hills. The carapace is crushed and broken, and shows no characteristic features; but the plastron, although rendered

Fig. 27.




*Hardella thurgi.*—Carapace. Reduced. *nu*, nuchal; *n* 1–*n* 8, neurals; *c* 1–*c* 8, costals; *spy* 1–2, suprapygals; *py*, pygal; *m* 1–*m* 11, marginals. [The hinder border of the 4th vertebral shield usually cuts the 7th instead of the 8th neural bone.]

convex by pressure, is well preserved. In its straight humero-pectoral sulcus this plastron agrees with the present species, as distinct from *Cachuga lineata* (compare 'Palæontologia Indica,' *op. cit.* pl. xxiii. figs. 1 *a* and 2 *a*). *Cautley Collection.*

**39834.** (*Fig.*) The somewhat imperfect shell of an adult female; from the Siwalik Hills. Figured by the writer, *op. cit.* pl. xxiv.

figs. 1, 1*a*, as *B. cautleyi*, of which it is the type. This specimen, in which the sutures of the bones are not visible, was specifically separated from the preceding on account of its more depressed form; but this feature is not regarded by Boulenger ('Catalogue of Chelonians, &c.' p. 64) as of any importance. *Presented by Dr. Hugh Falconer.*

**R. 598.** Cast of a portion of the carapace of an immature individual. The original was obtained from the Siwaliks of the Punjab, and is preserved in the Indian Museum, Calcutta. It is figured by the writer, *op. cit.* pl. xxv. fig. 1, as *B. falconeri*. *Made in the Museum*, 1885.

**R. 890.** The somewhat imperfect and crushed shell of an immature individual; from the Siwalik Hills. The nuchal is wanting, and the neurals and costals of the carapace are crushed in, and in the posterior region much dislocated. The anterior lobe of the plastron is broken off, the ento- and epiplastrals being preserved within the carapace. The xiphiplastrals are imperfect. The 3rd and 4th neurals have a strongly marked knob-like carina, as in the preceding[1] and following specimens. The contour of the first three vertebral shields is well shown.

*Cautley Collection.*

**R. 748.** (*Fig.*) The imperfect shell of a male; from the Siwaliks of Perim Island, Gulf of Cambay. Figured by the writer in the 'Quart. Journ. Geol. Soc.' vol. xlii. pl. xv., as *Clemmys watsoni*, of which it is the type; the describer being then unaware of the difference in the size of the sexes of the present species. *Presented by Col. J. W. Watson*, 1886.

**R. 603.** The imperfect shell of a male; from Perim Island. This specimen includes part of the middle region and right half of the carapace and plastron. It has been polished and worn by the action of water; but the boundaries of the bones and of the first three vertebral shields are still traceable.

*Presented by Diwán Wajeshanker Gowreeshanker*, 1885.

**R. 954.** Part of the right half of a shell probably referable to a male of this species; from Perim Island. This specimen

[1] In the description in the 'Palæontologia Indica' these bones in this specimen are incorrectly alluded to as the 4th and 5th.

agrees closely in contour with the preceding, but the sutures and sulci are obliterated. This specimen was presented to the East India Company's Museum in 1847 by A. Bettington, Esq.

*Transferred from the Indian Museum*, 1880.

*Specimens of which some may belong to* Hardella *and others to the typical group of* Cachuga.

**R. 957.** The imperfect carapace of a large individual; from the Siwalik Hills. The left side is wanting, and the inner aspect displays the dorsal vertebræ, both the axillary buttresses, and part of the left inguinal buttress. Probably referable to *Hardella*. *Cautley Collection.*

**39836.** A very large imperfect shell; from the Siwalik Hills. The posterior portion of the carapace is broken away, and the interior being free from matrix, the axillary buttresses are well shown. As in the preceding specimen, the sutures and sulci are not visible. *Cautley Collection.*

**R. 961.** A very large imperfect shell, wanting the posterior part of the carapace, and with the plastron very imperfect. *Cautley Collection.*

**16204.** An imperfect shell belonging to an individual not fully adult; from the Siwaliks. The posterior portion is wanting, while the bones of the neural region are chipped away, and most of the plastral sulci are invisible. On the right side the humerus and portions of the radius and ulna are preserved, and on the left the radius and the carpus. *Cautley Collection.*

**R. 889.** An imperfect shell; from the Siwaliks. *Cautley Collection.*

**R. 889 a.** Part of the right side of an immature shell. This specimen, which shows the whole of the marginals forming the bridge and some adjacent bones, is probably referable to a female of *Hardella thurgi*. *Cautley Collection.*

## Genus **CACHUGA**, Gray[1].

Including *Pangshura*, Gray[2].

Neural bones usually elongated, hexagonal, with short antero-

[1] Catalogue of Shield Reptiles, pt. i. p. 35 (1855).—*Kachuga.* [2] *Ibid.* p. 36.

lateral surfaces; 4th vertebral shield elongated, and extending over 4 or 5 neural bones. Plastron extensively united with the carapace by suture, with extremely long buttresses, which extend very far up on the costals, and almost reach the neurals, the inguinal buttress being wedged in between the 5th and 6th costals; sulcus between humeral and pectoral shields placed far behind the entoplastral bone (figs. 28, 29); xiphiplastrals notched.

With the exception of the 3rd, the vertebral shields are comparatively long, and all are more or less hexagonal The oral surfaces of the maxillæ have a median ridge, and the cutting-edges of the jaws are serrated.

A. *Typical Group.*

Third vertebral shield having a broad junction with the 4th, which overlies four neural bones; neurals elongated (fig. 28).

### Kachuga lineata, Gray [1].

Syn. *Emys lineata*, Gray [2].
*Batagur lineata*, Gray [3].
*Batagur kachuga*, Theobald [4].
*Batagur bakeri*, Lydekker [5].

The type species. Carapace of adult vaulted and smooth, but carinated in young. Nuchal shield small, widest behind; 2nd vertebral longer than 3rd, with which it forms a straight junction; sulcus between humeral and pectoral shields convex or forming an obtuse angle. Length of carapace 0,370 (14·6 inches).

*Hab.* India and Burma.

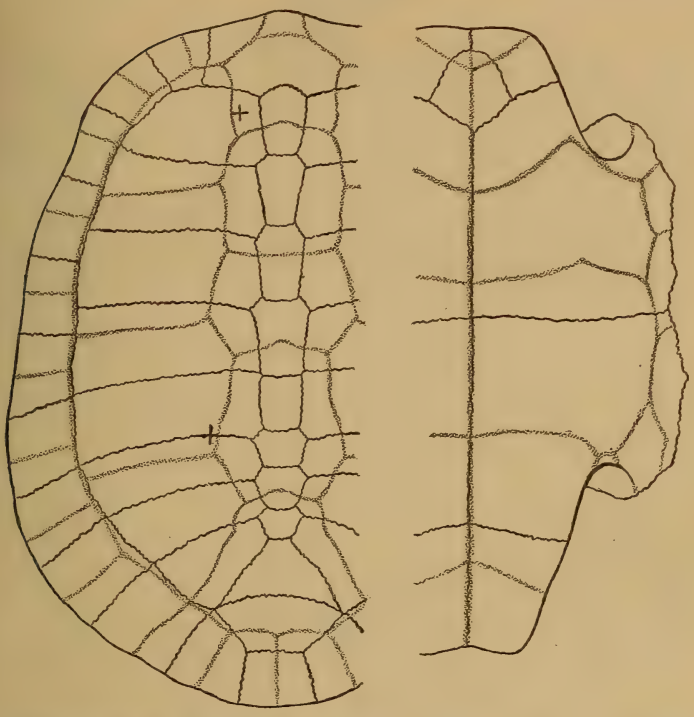
**39835 a.** (*Fig.*) The adult shell, imperfect posteriorly; from the Pliocene of the Siwalik Hills. Figured by the writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pl. xxiii. figs. 1, 1 *a*, and pl. xxiv. fig. 5, as *Batagur bakeri*, of which it is the type. Subsequent observations tend to show that this specimen is not specifically separable from the existing form. *Cautley Collection. Presented*, 1840.

**R. 891.** An imperfect immature shell; from the Siwalik Hills. The carapace does not show the position of the posterior border

[1] Synopsis Reptilium, p. 23 (1831).—*Emys.* [2] *Loc. cit.*
[3] Catalogue of Shield Reptiles, pt. i. p. 35 (1855).
[4] Catalogue of the Reptiles of British India, p. 19 (1876).
[5] Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. iii. p. 190 (1885).

of the 3rd vertebral shield; but the plastron has the curved humero-pectoral and pectoro-abdominal sulci characteristic of this species. *Cautley Collection.*

Fig. 28.



*Cachuga trivittata.*—Carapace and plastron; reduced. The + + indicate the inner extremities of the axillary and inguinal buttresses. (From Boulenger's 'Catalogue of Chelonia.')

## Cachuga dhongoka, Gray [1].

Syn. *Emys dhongoka*, Gray [2].
*Batagur dhongoka*, Gray [3].
*Batagur durandi*, Lydekker [4].

Carapace much depressed, carinated in young, and the carina persisting in the adult in the form of knobs on the anterior vertebral

[1] Illustrations of Indian Zoology, vol. ii. pl. lx. (1834).—*Emys.*
[2] *Loc. cit.* [3] Catalogue of Shield Reptiles, pt. i. p. 36 (1855).
[4] Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. iii. p. 192 (1885).

shields. Nuchal shield small, widest behind; 2nd vertebral with a pointed posterior border, more or less deeply interpenetrating the 3rd nuchal, which is usually shorter; sulcus between humeral and pectoral shields forming a right angle. Length of adult 0,350 (13·8 inches).

*Hab.* India.

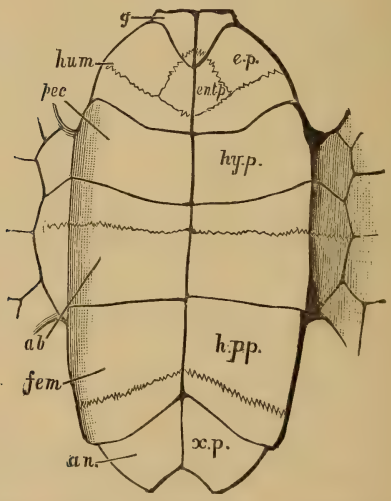
**39841.** (*Fig.*) The shell of an adult individual; from the Pliocene of the Siwalik Hills. Figured by the writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pl. xxiv. fig. 2, as *Batagur durandi*, of which it is the type. The 2nd vertebral shield interpenetrates the 3rd to an unusual extent, and this feature was regarded as a specific character, but it is more probable that it is merely individual.

*Cautley Collection. Presented*, 1840.

B. *Pangshurine Group.*

Third vertebral shield having a narrow junction with the 4th, which is pointed anteriorly, and overlies five neural bones; neurals generally short. (=*Pangshura*, Gray.)

Fig. 29.




*Cachuga tectum.*—The plastron; reduced. *ep*, epiplastral bone; *ent.p*, entoplastral do.; *hy.p*, hyoplastral do.; *hp.p*, hypoplastral do.; *x.p*, xiphiplastral do.; *g*, gular shield; *hum*, humeral do.; *pec*, pectoral do.; *ab*, abdominal do.; *fem*, femoral do.; *an*, anal do.

### Cachuga tectum (Gray[1])

Syn. *Emys tecta*, Gray[2].
*Emys tentoria*, Gray[3].
*Emys namadica*, Theobald[4].
*Pangshura tecta*, Günther[5].
*Pangshura tentoria*, Günther[6].
*Pangshura flaviventris*, Günther[7].

Carapace vaulted and tectiform, the ridge terminating in a prominence in the area occupied by the 3rd vertebral shield; nuchal shield small and quadrangular; 3rd vertebral pentagonal, pointed behind; 2nd vertebral as long as broad, overlying three neural bones; neurals short.

The first and second vertebral shields are subject to great variation in shape. The shell generally attains a length of about 0,185 (7·5 inches), but one recent specimen in the Museum has a length of 0,221 (8·7 inches).

*Hab.* India (Ganges and Indus basins).

**39837.** (*Fig.*) An imperfect adult shell; from the Pliocene of the Siwalik Hills. Figured by Murchison in Falconer's 'Palæontological Memoirs,' pl. xxxii. figs. 1–3, as *Emys tectum*; and also by the present writer in the 'Palæontologia Indica' (Mem. Geol. Surv. Ind.), ser. 10, vol. iii. pl. xxii. figs. 3 and 10, as *P. flaviventris*. Murchison's figure is incorrect, and the specimen is not the one referred to in the memoir accompanying the plate.

*Cautley Collection. Presented*, 1840.

### Cachuga, sp.

The undermentioned specimen differs from typical examples of *C. tectum* in that the short lateral sides of the 2nd vertebral shield are posterior instead of lateral.

*Hab.* India.

**17435.** (*Fig.*) The imperfect shell of a young individual; from the Pliocene of the Siwalik Hills. Figured by the writer in the 'Palæontologia Indica' (Mem. Geol. Surv. Ind.), ser. 10, vol. iii. pl. xxii. figs. 1 and 12. This is the specimen described

[1] Synopsis Reptilium, p. 23 (1831).—*Emys*. [2] *Loc. cit.*
[3] Proc. Zool. Soc. 1834, p. 54.
[4] Mem. Geol. Surv. Ind. vol. ii. p. 295 (1860).
[5] Reptiles of British India, p. 33 (1864).
[6] *Ibid.* p. 34. [7] *Ibid.* p. 35.

in 'Falconer's Palæontological Memoirs,' vol. i. pp. 382–387, as *Emys tectum*, although not the one represented in the accompanying plate (see No. 39837, *suprà*).

*Cautley Collection. Presented*, 1840.

### Generically Undetermined Specimens.

Of the following specimens from the Upper Eocene (Lower Oligocene) Phosphorites of Central France, it is probable that the majority are referable to land forms such as *Testudo*, *Stylemys*, or *Ptychogaster*.

**R. 384.** A left scapula; from Caylux (Tarn-et-Garonne). The precoracoid is broken. The specimen indicates a form of the approximate size of *Testudo radiata*. *Purchased*, 1884.

**R. 385.** The imperfect left scapulo-precoracoid of a smaller tortoise; from Caylux. *Purchased*, 1884.

**R. 421.** A right humerus, wanting the distal extremity; from Bach, near Lalbenque (Lot). This specimen would agree in relative size with No. R. 384. *Purchased*, 1884.

**R. 421 a.** A rather smaller right humerus, wanting the distal extremity; from Bach. *Purchased*, 1884.

**R. 421 b.** An apparently similar right humerus, wanting the proximal extremity; from Bach. *Purchased*, 1884.

**R. 424.** A much smaller right humerus, wanting the distal extremity; from Bach. Indicates a form of the approximate size of *Clemmys leprosa*. *Purchased*, 1884.

**R. 424 a.** A slightly smaller right humerus; from Bach. *Purchased*, 1884.

**R. 424 b.** Two nearly similar left humeri; from Bach. *Purchased*, 1884.

**R. 1301.** A left femur, agreeing approximately in relative size with the humerus No. R. 421; from Bach. *By exchange*, 1888.

**R. 422.** A smaller right femur; from Bach. *Purchased*, 1884.

**R. 383.** A still smaller right femur; from Caylux. *Purchased*, 1884.

R. 425. A somewhat smaller right femur; from Bach.
*Purchased*, 1884.

R. 423. A tibia; from Bach. This specimen indicates a larger individual than either of the preceding specimens.
*Purchased*, 1884.

## Family DERMATEMYDIDÆ.

This family, in which the nuchal bone has a long costiform process, appears to connect the *Chelydridæ* with the *Cinosternidæ*, the recent forms having the entoplastral bone and obturator notch of the former, and the procœlous caudal vertebræ, open temporal fossæ, and convex nuchal of the latter. The plastron may be united with the carapace either by suture, with the development of large buttresses (*Dermatemys*), or by a straight ligamentous suture (*Claudius*).

The occurrence of procœlous caudal vertebræ in one extinct genus (*Toxochelys*), which has been referred to the *Chelydridæ*, is suggestive of a transition between that and the present family, and any palæontological definition of the latter would therefore be premature.

The undermentioned genus is provisionally referred to the *Dermatemydidæ* on account of the resemblance of its long and narrow vertebral shields to those of the Eocene *Baptemys* and the existing *Dermatemys*, and also from the resemblance of its vermiculated shell to that of the latter. The so-called *Adocidæ* of Cope[1] are probably also referable to the *Dermatemydidæ*, the abortion of the heads of the ribs not being a character of family value. In the Cretaceous *Adocus* there are traces of vermiculation, which are more distinct in the Eocene *Agomphus* (with which *Amphiemys* is stated by Baur[2] to be identical); and it has yet to be proved that the latter is really distinct from the undermentioned genus. While *Agomphus* was placed by Cope (*l. c.*) in the *Emydidæ* next *Dermatemys*, *Amphiemys* was referred to the *Adocidæ*.

### Genus **TRACHYASPIS**, Meyer[3].

Shell with vermiculated sculpture. Neural bones 8 in number, hexagonal, and mostly elongated, with short antero-lateral surfaces. Vertebral shields long and narrow. Plastron unknown.

[1] Vertebrata of Tertiary Formations of the West—Rep. U.S. Geol. Surv. Terrs. vol. iii. p. 113 (1884).

[2] Zool. Anz. vol. ii. p. 525 (1888).

[3] Neues Jahrb. 1843, p. 699.

In the one species of which the entire carapace is known (fig. 30) there is one entire neural and part of another between the first pair of costals, so that there are three entire neurals and half of a fourth in advance of the sulcus between the 2nd and 3rd vertebral shields. There are also five costal shields.

The costals from the Lower Greensand, described by Pictet and Campiche[1] as *T. sanctæ-crucis*, present all the characters of those of this genus, but are referred by Rütimeyer[2] to *Plesiochelys* as *P. rugosa*.

This genus has been considered to be allied to *Trionyx* or *Tretosternum*; but in the contour of the long vertebral shields, in the elongated neural bones, and the nature of the sculpture it appears to be related to *Dermatemys*, and it certainly has nothing to do with *Trionyx*. The carapace agrees with that of *Dermatemys* in the late period at which the marginals unite with the costals, and in the manner in which the extremities of the ribs underlie the marginals. In *Dermatemys* there are, however, but four costal shields, the neural bones are reduced to seven, and the second is undivided, so that there are only two entire neurals and one half of a third in advance of the sulcus between the second and third vertebral shields. Another point of resemblance to *Dermatemys* is found in the slight depth of the sulci marking the boundaries of the epidermal shields, the same feature being observable in the Eocene American genus *Agomphus*.

### Trachyaspis lardyi, Meyer[3].

The type species; imperfectly known. Carapace without longitudinal costal ridges; vertebral shields wide, and extending a considerable distance on to the costals.

*T. miocæna*, Delfortrie[4], from the Middle Miocene of Bordeaux, appears to be a closely allied form.

*Hab.* Europe (Switzerland).

**48041.** Cast of the proximal extremity of a costal bone. The original is one of the types, and was obtained from the Middle Miocene of Mont La Molière, near Neufchâtel, Switzerland. It is preserved in the Museum at Lausanne, and is described and figured by Meyer in the 'Palæontographica,'

[1] Paléontologie Suisse, sér. ii. Foss. Crétac. de Ste.-Croix, pt. i. p. 36, pl. iv. (1858–60).

[2] N. Denkschr. schw. Ges. Nat. vol. xxv. art. 2, p. 147 (1873).

[3] *Loc. cit.* [4] Act. Soc. Linn. Bordeaux, vol. xxvii. p. 420 (1869).

vol. vi. art. 1, p. 56, pl. viii. fig. 2, and also by Pictet in his 'Paléontologie Suisse: Chéloniens de la Molasse,' pl. xxi. fig. 3. The specimen is described by Meyer as the third or fifth costal of the left side; but it would appear to be a late right costal. It shows the outer sulcus of a vertebral shield, which forms a distinct V, and the proximal part of a sulcus between two of the costal shields. The neural shields were evidently of considerable width.

*Brown Collection. Presented by Sir R. Owen, K.C.B.*, 1860.

**Trachyaspis hantoniensis,** Lydekker[1].

There is at present no decisive evidence to show whether this form is distinct from the preceding, although its much lower horizon would indicate the probability that this is the case.

*Hab.* Europe (England).

**R. 1443.** The nearly entire penultimate marginal of the left side; from the Upper Eocene (Lower Oligocene) of Hordwell, Hampshire. The type. The upper and lower borders are somewhat broken; the extremity of the sulcus of the eighth costal shield is shown, and also that between the antepenultimate and penultimate marginal shields, both having the same arrangement as in *Dermatemys*. Part of the pit for the rib also remains; in its curvature the specimen agrees with the hinder marginals of *T. ægyptiaca*.

*No history.*

**Trachyaspis ægyptiaca,** Lydekker[2].

Carapace depressed and ovoid, with a median and a pair of costal keels. Vertebral shields long and narrow, their lateral portion only extending a short distance on to the costals, and not forming a distinct V. Sculpture finer than in the type species. Five costal shields.

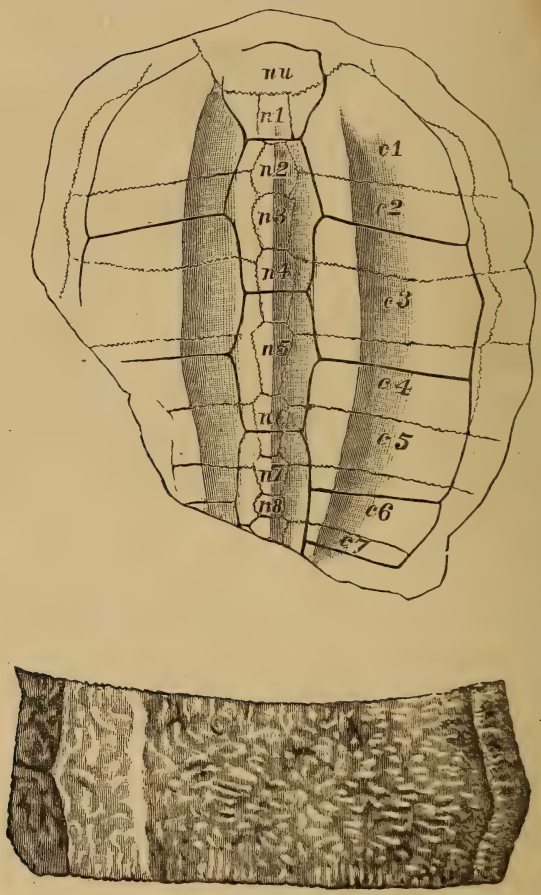
*Hab.* Egypt.

**R. 229.** (*Fig.*) The imperfect carapace, with the inner cavity filled with matrix; found in beds of unknown Tertiary age during the digging of the Suez canal. The type; figured in the woodcut on the next page. Except on the right side the margin is imperfect, and a considerable portion of the

[1] Ann. Mag. Nat. Hist. ser. 6, vol. iii. p. 54 (1889).
[2] *Ibid.* p. 53 (1889).

posterior region of the left side is broken away. The nuchal bone is imperfect, but the contour of the portion remaining is very like that of *Dermatemys*, and apparently indicates that the anterior border was not emarginate. The whole of the neural bones and the sulci of the vertebral shields are distinctly shown, and the relations of the anterior shields are generally similar to those of *Der-*

Fig. 30.




*Trachyaspis ægyptiaca.*—The carapace; from Tertiary (?) beds in Egypt. $\frac{1}{8}$. The third right costal is shown below on a larger scale, with the sculpture. Each segment of the divided second neural has been separately numbered, so that the neural marked 4 is really the third.

*matemys*; there are, however, five costal shields, and the fourth vertebral shield is in consequence proportionately elongated. The marginals on the right side are fairly preserved, and show a distinct line of separation from the costals; in the posterior costals of this side the articular extremity of the rib is well shown.

*Presented by Sir R. Owen, K.C.B.*, 1880.

## Family CHELYDRIDÆ.

Shell usually not fully ossified till a late period; plastron frequently small, with or without vacuities, and articulating with the carapace by gomphosis, without axillary and inguinal buttresses; nuchal emarginate, with a long costiform process underlying the anterior marginals. In existing forms most of the caudal vertebræ opisthocœlous; chevrons present. Skull (when known) more or less triangular in form and wide posteriorly, with the temporal fossæ partially roofed, the squamosal not being connected with the parietal; no floor to narial passage; tympanic ring of typical forms in great part closed posteriorly. Scapula joining precoracoid at a right angle. Humerus (fig. 31), when known, with the well-developed and broad head placed obliquely to the curved shaft, and the radial process forming a strong ridge at right angles to the dorsal surface of the shaft, and the ulnar process also deflected ventrally. Limbs not modified into paddles. Pelvis with an obturator notch. Epidermal shields absent in some cases. Skull relatively large, and the head incompletely retractile.

Our imperfect knowledge of the fossil forms provisionally included in this family renders it necessary to regard the foregoing diagnosis as purely provisional, more especially as there are indications among fossil forms of a more or less complete transition between the present and preceding families.

### Subfamily CHELYDRINÆ.

Shell smooth and covered with epidermal shields; the plastron small and cruciform, with vacuities persisting till a late period, a narrow bridge, and an oblique suture between hypo- and xiphiplastrals; 11 marginals; neurals of the full number, and short and wide; caudal vertebræ mostly opisthocœlous. Vertebral shields wider than long.

## Genus **CHELYDRA**, Schweigger [1].

Syn. *Chelydropsis*, Peters [2].

Skull with the lateral borders of the face highly convex, and the orbits directed upwards and outwards. Shell (fig. 32) with the emargination of the nuchal not very deep; neural bones hexagonal, with short antero-lateral surfaces; supramarginal shields absent; posterior border of carapace serrated. Skull not excessively large in proportion to shell.

Fig. 31.

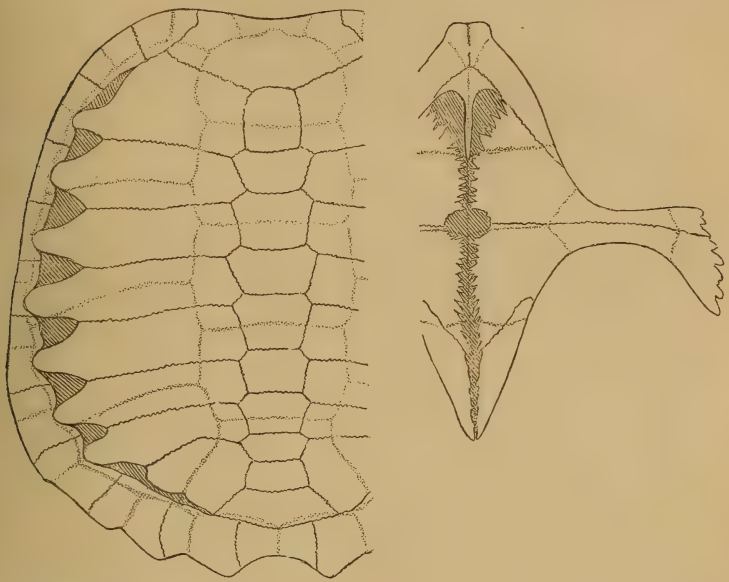
*Macroclemmys temminckii.*—Dorsal aspect of the left humerus. *a*, entocondyle; *b*, ectocondyle; *d*, ectepicondyle; *e*, ectepicondylar foramen; *g*, head; *h*, radial (lateral) process; *i*, ulnar (mesial) process. (*After Dollo.*)

The name *Chelydropsis* was applied to a Chelydroid from the Middle Miocene of Styria, said to have two nuchals; this is, how-

[1] Prodromus Mon. Cheloniorum, p. 23 (1812).
[2] Sitz. k. Ak. Wien, vol. lvii. pt. i. p. 73 (1868).

ever, regarded by Boulenger[1] as an abnormal and not a generic character.

Fig. 32.



*Chelydra serpentina.*—Carapace and plastron; reduced. (From Boulenger's 'Catalogue of Chelonians.')

## **Chelydra murchisoni,** Bell[2].

Syn. *Chelydra œningensis,* Meyer[3].
*Clemmys* (?) *kargi,* Fitzinger[4].
*Hydraspis* (?) *œningensis,* Fitzinger[5].

Tail long; carapace widest at a point posterior to its junction with the plastron; epiplastrals large and slightly divergent; outer extremity of hyoplastral produced anteriorly at its junction with the carapace to an equal extent with that of the hypoplastral; xiphiplastrals acute.

Allied to the existing *C. rossignonii*[6] of Mexico.

*Hab.* Europe (Switzerland).

[1] Catalogue of Chelonians, &c. p. 12, note.
[2] Trans. Geol. Soc. ser. 2, vol. iv. pt. ii. p. 380 (1836).
[3] Fauna der Vorwelt—Säugeth. aus dem Molasse, p. 12 (1845). Quoted as Bell, Proc. Geol. Soc. vol. i. p. 342 (1832), where the name does not occur.
[4] Ann. Mus Wien, vol. i. p. 127 (1835). [5] *Loc. cit.*
[6] See Boulenger, 'Catalogue of Chelonians,' &c. p. 23.

**37204.** Slab showing the dorsal aspect of the imperfect skeleton; (*Fig.*) from the Upper Miocene of Œningen, Switzerland. The greater portion of the carapace is absent. The type specimen; noticed by Murchison in the 'Trans. Geol. Soc.' ser. 2, vol. iii. p. 281, and described and figured by Bell in vol. iv. p. 379, pl. xxiv. of the same serial. It is also noticed in the 'Proc. Geol. Soc.' vol. i. p. 342 (1832), but without specific name. A larger specimen is figured by Meyer in his 'Fauna der Vorwelt—Säugethiere etc. aus dem Molasse,' pl. xii. *Purchased*, 1863.

**42920.** Slab showing the ventral aspect of a very imperfect skeleton; (*Fig.*) from Œningen. Figured by Winkler in his 'Tortues Fossiles' (Haarlem, 1869), pl. xix. None of the carapace is shown. *Van Breda Collection. Purchased*, 1871.

**42287.** Slab showing the ventral aspect of the nearly entire skeleton (*Fig.*) of a young individual; from Œningen. Figured by Winkler, *op. cit.* pl. xx. The whole contour of the carapace is shown, and the shell and greater part of the caudal region are also visible. The distinctive characters of the plastron of this species are shown in the figures given by Meyer in the 'Palæontographica,' vol. ii. pl. xxx.
*Van Breda Collection.*

### **Chelydra decheni,** Meyer [1].

Carapace much expanded posteriorly; tail short; epiplastrals large and widely divergent posteriorly; outer extremities of hyo- and hypoplastrals greatly produced antero-posteriorly, that of the hyoplastrals reaching as far forwards as the suture between the epiplastrals; xiphiplastrals broad.

*Hab.* Europe (Germany).

**42732.** Slab of lignite showing the dorsal aspect of the nearly entire (*Fig.*) skeleton of a young individual; from the Lower Miocene (Upper Oligocene) of Rott, near Bonn. Figured by Meyer in the 'Palæontographica,' vol. xv. pl. ix. fig. 1. This specimen shows the skull, the greater part of the carapace, the left manus, and the right hyoplastral, which has been displaced. *Van Breda Collection. Purchased*, 1877.

**30266.** Slab of lignite showing the impression of the dorsal aspect of the anterior part of the skeleton, together with frag-

[1] Palæontographica, vol. ii. p. 242 (1852).

ments of some of the bones themselves; from Rott. This specimen is considerably larger than the preceding, and agrees very nearly in this respect with the type skeleton from the same beds, figured by Meyer in the 'Palæontographica,' vol. ii. pl. xxviii. The middle of the nuchal bone is preserved, and the contour of the anterior vertebral and costal shields is clearly indicated.

*Purchased*, 1855.

## Subfamily TRETOSTERNINÆ.

Carapace with pustulate sculpture and epidermal shields; no persistent vacuity in the plastron, which has a long bridge; a straight suture between the hypo- and xiphiplastrals; neural bones hexagonal, long and comparatively narrow, with short antero-lateral surfaces, number unknown; caudal vertebræ and number of marginals unknown. Provisionally included in the family. Baur[1] states that *Toxochelys*, Cope, of the American Cretaceous, which he regards as a true Chelydroid, has procœlous caudal vertebræ and the tympanic ring open.

### Genus **TRETOSTERNUM**, Owen[2].

Syn. *Peltochelys*, Dollo[3].

The type and only definitely known genus of the subfamily. Plastron with an intergular and five pairs of plastral shields. Anterior border of carapace deeply emarginate, and the skull probably therefore very large; dorsal surface of neurals sculptured. The plastron has distinct axillary and inguinal notches, and the xiphiplastrals are not notched. Skull known only in young. It is somewhat difficult to know whether to regard the azygous median plastral shield as coalesced gulars or as an intergular; if the former view be adopted, the shields here termed gular will be humeral.

Whether the imperfect Chelonian remains from the Cretaceous of the United States, described by Leidy[4] under the name of *Compsemys*, are entitled to generic distinction from *Tretosternum* remains to be proved. The type specimens are described as being covered with granular tubercles. *Peltochelys* is noticed below.

[1] Ann. Mag. Nat. Hist. ser. 6, vol. iii. p. 58 (1889).

[2] Rep. Brit. Assoc. for 1841, p. 165 (1842).—*Tretosternon.*

[3] Bull. Mus. R. Hist. Nat. Belg. vol. iii. p. 78 (1884).

[4] Proc. Ac. Nat. Sci. Philad. 1856, p. 312. See also Cope, Rep. U.S. Geol. Surv. Terrs. vol. ii. pl. vi. figs. 15, 16 (1875).

The sculpture of the shell is the same as in the Neocomian genus *Helochelys*, which is noticed among the Amphichelydia, and is at once distinguished by the presence of a mesoplastral element.

### **Tretosternum bakewelli** (Mantell [1]).

Syn. *Trionyx bakewelli*, Mantell [2].
(?) *Peltochelys duchastellii*, Dollo [3].

Apparently smaller than the next species, with the sculpture on the plastron more or less vermiculated instead of simply pustulate, and the costal bones much expanded distally.

The generic identity of *Peltochelys* with *Tretosternum* was indicated in a paper published by G. A. Boulenger and the present writer in the 'Geol. Mag.' dec. iii. vol. iv. pp. 273, 274 (1884). All the specimens of *Tretosternum* were, however, then referred to a single species; the Belgian form is provisionally referred to the present species as the commoner Wealden type.

*Hab.* Europe (England and Belgium).

All the known specimens are from the Wealden.

**2265.** (*Fig.*) Slab showing the dorsal surface of a costal bone; from the Wealden of Cuckfield, Sussex. The type specimen; figured by Mantell in his 'Illustrations of the Geology of Sussex,' pl. vi. fig. 1 (1827), without name, and also in his 'Geology of the South-east of England,' p. 255, as the type of *Trionyx bakewelli*. On p. 167 of the 'Rep. Brit. Assoc.' for 1841, these and the other specimens figured by the same writer are identified by Owen with his *Tretosternum punctatum* of the Purbeck. The specimen shows the outer sulcus of one of the vertebral shields, and another sulcus dividing two costal shields and joining part of a marginal sulcus. The vertebral shields were evidently of the wide type characteristic of existing *Chelydridæ*.

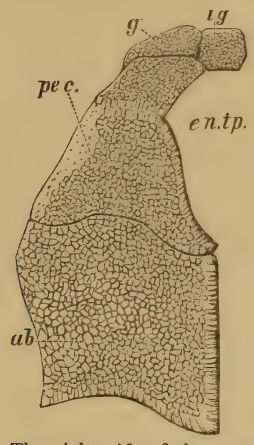
*Mantell Collection. Purchased*, 1838.

**3598.** (*Fig.*) The anterior extremity of the plastron, imperfect on the left side, and partly embedded in matrix; from Cuckfield. This specimen, which very probably belongs to the same individual as No. 2265, and may be regarded as one of the types, is figured by Mantell in his 'Illustrations of the Geology of Sussex,' pl. vi. fig. 3, and noticed by Boulenger

[1] Geology of the South-east of England, p. 255 (1833).—*Trionyx*.
[2] *Loc. cit.* [3] Bull. Mus. R. Hist. Nat. Belg. vol. iii. p. 78 (1884).

and the present writer, *op. cit.* p. 275. It comprises the whole of the right and part of the left epiplastral, and shows the whole contour of the intergular and gular shields, together with the upper part of the pectoral; it

Fig. 33.




*Tretosternum bakewelli.*—The right side of the anterior extremity of the plastron; from the Wealden. *ig*, intergular shield; *g*, gular do.; *pec*, pectoral do.; *ab*, abdominal do.; *entp*, space for entoplastral bone. The suture between the epi- and hyoplastral is shown to the left of *entp*. Reduced.

is figured in the accompanying woodcut in connection with the next specimen. There is no humeral shield.

*Mantell Collection.*

**2276.** (*Fig.*) The imperfect right hyoplastral apparently belonging to the same individual as the preceding specimen; from Cuckfield. Figured in the accompanying woodcut in connection with the latter. The vermiculated character of the sculpture, especially on the lower half, is well shown.

*Mantell Collection.*

**R. 658.** The imperfect left hyoplastral; from the Lower Wealden (Tilgate Grit) of Battle, Sussex. This specimen has lost the anterior extremity, but shows the median suture and the commencement of the incision for the entoplastral, as well as part of the sulcus formed by the division between the gular and pectoral shields. The vermiculated nature of the sculpture is very clearly shown, and clearly distinguishes the specimen from the hyoplastrals of *T. punctatum*. *Presented by J. E. Lee, Esq.*, 1884.

**3543.** The inguinal region of the right hypoplastral; from Cuckfield. The vermiculated nature of the sculpture is very marked. *Mantell Collection.*

**3543 a.** The axillary region of the right hyoplastral; from Cuckfield. Probably associated with the preceding. *Mantell Collection.*

**2275 x.** The left xiphiplastral; from the Wealden of Cuckfield. Except for its larger size, this specimen cannot be distinguished from the xiphiplastral of the type specimen of *Peltochelys* figured by Dollo in the 'Bull. Mus. R. Hist. Nat. Belg.' vol. iii. pl. iii. fig. 2. *Mantell Collection.*

**26029.** Fragment of sandstone, showing the outer surface of a small portion of the carapace; from Cuckfield. *Mantell Collection. Purchased*, 1838.

**39213.** Fragment of Tilgate grit, showing a posterior marginal bone belonging either to this or the next species. *Purchased*, 1865.

**3528.** Fragment of sandstone, showing part of a costal of a small individual; from Cuckfield. *Mantell Collection. Purchased*, 1853.

### **Tretosternum**, sp.

Larger than the preceding, with the outer extremity of the gular shield extending lower down on the plastron; plastral sculpture as in *T. bakewelli*. Whether these differences are specific or sexual cannot at present be determined.

*Hab.* Europe (England).

**R. 970.** Part of the right epiplastral; from the Wadhurst Clay (Lower Wealden) near Hastings, Sussex. This specimen shows the outer part of the gular shield, which extends lower down on the side of the pectoral than in *T. bakewelli*, No. 3508. *Dawson Collection. Purchased*, 1887.

**R. 970 a.** Fragment of the right hyoplastral associated with the preceding. *Dawson Collection.*

**R. 970 b.** A right posterior costal bone, not improbably referable to the same species as the preceding; from the Wadhurst Clay near Hastings. *Dawson Collection.*

**Tretosternum punctatum,** Owen[1].

The type species. Of considerable size, with the sculpture on the plastron in the form of distinct conical pustules, and the outer extremities of the costal bones not greatly enlarged.

The type specimens are from the Purbeck, and were in the Collection of Sir P. Egerton; but nothing is now known of their whereabouts.

*Hab.* Europe (England).

**R. 171.** An imperfect carapace and plastron, in a number of fragments; from the Wealden of the Isle of Wight. Noticed by Boulenger and the present writer in the 'Geol. Mag.' dec. iii. vol. iv. p. 273. The chief fragments are indicated by separate letters, as follows:—*a*. The nuchal bone, imperfect posteriorly: this specimen shows the deep anterior emargination, together with the base of the costiform processes characteristic of the *Chelydridæ*. *b*. Three neural bones, with portions of the arches of the subjacent vertebræ; the vertebral centra were evidently far below the level of the carapace, with a vacuity above the centrum of each segment, as in existing *Chelydridæ*. *c*. A neural attached by its dorsal surface to the ventral aspect of the imperfect eighth costal of the left side; the neural is elongated. *d*. Part of the supra-pygal region of the carapace, with a sacral vertebra attached; the vertebra, as noticed on p. 274 of the memoir cited, shows a large attachment for a sacral rib, which is decisive as to the Cryptodiran affinities of the genus[2]. *d'*. Six imperfect costal bones. *d''*. The imperfect eighth costal of the right side. *e*. A number of marginal bones and other portions of the peripheral region of the carapace. *f*. The imperfect plastron, comprising portions of the epiplastrals, the entire entoplastral, the two hyoplastrals, and the left hypoplastral. The right hyoplastral consists of two portions, the lower of which would seem at first sight to represent a mesoplastral element; but since no similar division is observable on the opposite side, it would seem that this line of division is accidental.

*Fox Collection. Purchased*, 1882.

[1] Rep. Brit. Assoc. for 1841, p. 165 (1842).

[2] In Pleurodira the ilium anchyloses to the carapace, and in the adult sacral ribs are either atrophied or totally wanting.

**48349.** Slabs of limestone, containing numerous fragments of the carapace and plastron, together with part of the pelvis; from the Middle Purbeck of Durdlestone Bay, near Swanage. The portions of the shell are too broken to afford any characters of importance; but the distal portion of a pubis, apparently of the right side, is noteworthy. This bone, which is noticed on p. 274 of the memoir cited, is of rather peculiar shape, owing to the great elongation and distal expansion of the inner or symphysial branch; it is intact and shows that the extremity of the outer branch was thin and compressed, and had no anchylosis with the plastron. *Beckles Collection. Purchased*, 1876.

**48352.** Slab of limestone, showing the internal surface of part of two costal bones, and the glenoidal extremity of the scapulo-precoracoid; from Durdlestone Bay. This specimen may have belonged to the same individual as the last. This bone has a long neck above the glenoid cavity, in which respect it differs from *Chelydra*, and resembles many *Pleurodira*, such as *Chelodina*. *Beckles Collection.*

**46325.** The right hyoplastral embedded in a slab of rock with the outer surface exposed; from the Purbeck of Swanage, Dorsetshire. Noticed by Boulenger and the present writer, *op. cit.* p. 273; it shows the sulcus between the gular and pectoral shields, and also the one between the pectoral and the marginal and axillary shields. The denticulated surface for articulation with the carapace is well displayed. In essential characters this specimen agrees very closely with the corresponding element of No. R. 171, although the axillary notch is relatively wider—a difference which may be merely of sexual value. The articular surface for the entoplastral accords well with the entoplastral of No. R. 171.

*Cunnington Collection. Purchased*, 1875.

**R. 171 x.** Part of the left epiplastral; from the Wealden of the Isle of Wight. This specimen has a more curved contour than the epiplastral of *T. bakewelli*, but the contour of the epidermal shields is not shown. *Fox Collection.*

**R. 171 y.** An imperfect left hypoplastral; from the Isle of Wight. Is indistinguishable from the corresponding element of No. R. 171. *Fox Collection.*

**R. 1446.** Slab of limestone showing an imperfect costal bone of a small individual; from the Purbeck, locality unknown.

*No history.*

## Subfamily ANOSTIRINÆ.

Shell with vermiculated sculpture, and without (or with very thin) epidermal shields; no persistent vacuity in plastron, which has a moderately long bridge, and a nearly or quite straight suture between the hypo- and xiphiplastrals; neural bones seven in number, hexagonal, and long or narrow; typically 10 marginals; caudal vertebræ unknown.

The writer provisionally follows Cope[1] in including the type genus in the present family, with which it agrees closely in the form of the shell. On account of the presence of only 10 marginal bones, and the reduction in the number of the neurals, Baur[2] has proposed to refer it to the *Dermatemydidæ* (*Staurotypidæ*) or *Cinosternidæ*. The presence of the full number of neurals in *Baptemys* (*Dermatemydidæ*) shows, however, that the number of these bones is not of family value; while in the same family we have *Dermatemys* with 11 and *Staurotypus* with 10 marginals. The Chelydroid character of the skull referred to *Pseudotrionyx* is in favour of Cope's view.

### Genus **ANOSTIRA,** Leidy[3].

Anterior border of carapace deeply emarginate; plastron articulating with carapace by suture, and bridge without distinct inguinal notch; suture between hypo- and xiphiplastrals forming an obtuse angle; dorsal surface of neurals and ventral surface of anterior marginals smooth; posterior border of carapace serrated; skull unknown.

The type species is from the Upper Eocene of North America. Baur[4] states that there are traces of thin epidermal shields on the carapace.

### **Anostira anglica,** Lydekker[5].

Imperfectly known. Of large size, the length of the carapace being approximately four times that of the typical specimen of *A. ornata*, Leidy, which measures 0,120 (4·7 inches).

*Hab.* Europe (England).

[1] Vertebrata of the Tertiaries of the West—Rep. U. S. Geol. Surv. Terrs. vol. iii. p. 112 (1884).

[2] Ann. Mag. Nat. Hist. ser. 6, vol. iii. p. 58, note (1889).—On page 276 of same it is suggested that this subfamily should form a distinct family.

[3] Proc. Ac. Nat. Sci. Philad. 1871, p. 102.—*Anosteira.* [4] *Loc. cit.*

[5] Ann. Mag. Nat. Hist. ser. 6, vol. iii. p. 54 (1889).

**33198 x.** (*Fig.*) An anterior marginal bone, apparently the third of the right side; from the Upper Eocene (Lower Oligocene) of Hordwell, Hampshire. The general contour of this specimen (fig. 34) agrees closely with the third right marginal of the type carapace of *A. ornata* figured by Leidy in the 'Rep. U. S. Geol. Surv. Terrs.' vol. i. pt. i. pl. xvi. fig. 2 (1873), but is relatively longer. In point of size it agrees more nearly with the marginals of *A. radiolina* figured by Cope in vol. iii. pl. xviii. figs. 18, 19, of the same publication, the transverse section being of precisely the same type. The inner surface of the bone is devoid of sculpture; and the sculpture on the outer surface appears to form more distinct lines than in the type species. *Hastings Collection. Purchased,* 1855.

Fig. 34.

*Anostira anglica.*—An anterior marginal; from the Hordwell Beds. ⅔.

Fig. 35.

*Anostira anglica.*—The left xiphiplastral; from Hordwell. ½.

**33198 y.** (*Fig.*) The left xiphiplastral, wanting a fragment of the distal extremity; from Hordwell. This specimen (fig. 35) is the type, and agrees closely in contour with the imperfect xiphiplastral of the typical species, showing the somewhat oblique line of suture with the hypoplastral characteristic of *Anostira* as distinct from *Pseudotrionyx*. There is no trace of any sulci for epidermal shields on the outer surface. The inner surface shows the absence of any

pelvic attachment. The transverse diameter at the proximal extremity is 0,070 (2·75 inches).

*Hastings Collection.*

## Genus **PSEUDOTRIONYX,** Dollo[1].

Syn. (?) *Apholidemys,* Pomel[2].

Contour of anterior portion of carapace unknown; plastral bridge of considerable length, with a distinct inguinal notch; suture between hypo- and xiphiplastral forming a perfectly straight line, dorsal surface of neurals sculptured; posterior border of carapace entire.

The skull provisionally referred to this genus agrees in its relatively large size and general characters with that of *Macroclemmys*, but is more vaulted, with the orbits larger and directed somewhat upwardly, larger nares, a narrower bar between orbit and nares, and a wider and more concave palate.

This genus is probably the same as the imperfectly described *Apholidemys* of the Lower Eocene of Cuysse-la-Motte.

### **Pseudotrionyx delheidi,** Dollo[3].

The type and only described species. Of the approximate dimensions of small individuals of *Macroclemmys temminckii.*

The type specimen is from the Middle Eocene of Belgium, and it is therefore possible that the undermentioned Lower Eocene specimens may be specifically distinct.

*Hab.* Europe (Belgium and England).

**38953.** (*Fig.*) The imperfect cranium; from the London Clay (Lower Eocene) of the Isle of Sheppey. Figured (when much concealed by matrix) by Owen in his 'Reptilia of the London Clay' (Mon. Pal. Soc.), pt. ii. pl. xxix. figs. 1, 2; and noticed by the present writer in the 'Quart. Journ. Geol. Soc.' vol. xlv. p. 242. In its general characters this skull accords so closely with that of *Macroclemmys* that there can be little, if any, hesitation in referring it to the present form; this reference being confirmed by the total absence of the impression of horny shields, indicating that the skull, as in the *Trionychidæ*, was merely covered with skin. The chief characters in which this skull

[1] Bull. Mus. R. Hist. Nat. Belg. vol. iv. p. 96 (1886).
[2] Arch. Sci. Phys. Nat. sér. iv. vol. iv. p. 328 (1847).
[3] *Loc. cit.*

agrees with that of *Macroclemmys* are as follows, viz.:— the markedly triangular form and the great width across the tympanic region, the roofing over of the temporal fossa, the apparent similarity in the contour of the occipital surface and of the tympanic ring, the identity in the general plan of structure of the lateral portion of the palate and of the postorbital septum. The character of the latter septum indicates decisively the Cryptodiran affinities of this skull.

*Bowerbank Collection. Purchased*, 1865.

**40099.** The imperfect posterior extremity of the shell; from Sheppey. Noticed by G. A. Boulenger and the writer in the 'Geol. Mag.' dec. iii. vol. iv. p. 274, where it is referred to the present species. This specimen shows no characters by which it can be specifically distinguished from the type carapace figured by Dollo in the 'Bull. Mus. R. Hist. Nat. Belg.' vol. iv. pl. i. It exhibits the seventh neural, which is of very small size, the imperfect seventh and the entire eighth costals, and the supra-pygal. The eighth costals meet in the middle line. Some fragments of costals are shown on the inferior aspect of the specimen. *Purchased*, 1866.

**38965.** A pygal bone; from Sheppey. This specimen agrees well with the contour of the corresponding bone (marginal of Dollo) in the type; its length being 0,072 (2·85 inches), and its distal diameter 0,670 (2·65 inches). It is relatively larger than the pygal of the type species of *Anostira*, but exhibits the same sudden thickening at the commencement of the free portion, and a similar dorsal ridge. In the type specimen these features are lost by crushing.

*Bowerbank Collection.*

**38966.** A smaller pygal, imperfect distally; from Sheppey.

*Bowerbank Collection.*

*The following specimens may perhaps belong to this form.*

**37217.** Fragment of a bone which is apparently a portion of a nuchal; probably from the London Clay of Sheppey. There is a pair of mesial prominences apparently corresponding to those mentioned by Leidy as occurring in the nuchal of *Anostira*. *Purchased*, 1860.

**R. 1445.** Part of an anterior marginal bone; from the London Clay of Sheppey. The outer border and one suture are entire. The inner surface is smooth, the whole bone is much more massive than the anterior marginals of *Anostira*, and also differs by the regularly elliptical form of the surface for sutural union with the adjacent marginal.

*Purchased*, 1847.

**38971.** An imperfect right humerus, which may be referable to this form; from the Middle Eocene of Bracklesham, Sussex. This specimen, which wants the head and the extremity of the ulnar process, differs from the humerus of all existing Chelonians in the great development of the radial condyle, which resembles that of Lizards. The ectepicondylar foramen, of which the outer bar is broken away, pierces the bone at a considerable distance above the ectepicondyle and is thereby peculiar. The contour of the proximal extremity of the bone is not unlike that of *Macroclemmys*. If this specimen does not belong to the present genus, it must indicate a new type.

*Bowerbank Collection. Purchased*, 1865.

## Family ACICHELYIDÆ[1].

Shell cordiform, more or less incompletely ossified, the plastron having a vacuity which persists for a long period, if not throughout life; nuchal without costiform process. Plastron connected with carapace by axillary and inguinal buttresses[2]. Nature of caudal vertebræ unknown. Temporal fossæ of skull partially roofed. Humerus (fig. 1, A) with the head imperfectly developed, the shaft but little curved, and the radial and ulnar processes small; the former placed on the level of the head. All the phalangeals clawed.

As already mentioned (*suprà* p. 27), it is probable that this family may be regarded as including the ancestors of the *Chelonidæ*. From their common occurrence in the marine deposits of the Kimeridge Clay, and their apparent rarity in the freshwater beds of the Wealden, it is probable that the *Acichelyidæ* were mainly of marine habits.

[1] = *Eurysternidæ*, Dollo (1880) = *Thalassemydes*, Rütimeyer (1873).

[2] See Rütimeyer, N. Denkschr. schw. Ges. Nat. vol. xxv. art. 2, p. 38.

## Genus **THALASSEMYS**, Rütimeyer[1].

Syn. *Enaliochelys*, Seeley[2].

Carapace moderately thick, flattened, with or without anterior emargination, the costals well ossified, and the posterior neurals not forming a tectiform ridge; neurals more or less elongated, mostly hexagonal, with short antero-lateral surfaces; 5th neural with entire postero-lateral border. Vertebral shields comparatively narrow, with the underlying area devoid of flutings. Marginals apparently wider than in *Acichelys*. Very large persistent vacuities in the plastron.

### **Thalassemys hugii**, Rütimeyer[3].

Syn. *Enaliochelys chelonia*, Seeley[4].

The type species. Of very large dimensions, being the largest of the Kimeridgian forms. Carapace very slightly emarginate anteriorly, with the 2nd, 3rd, and 4th vertebral shields narrowed in front; neurals long and narrow.

*Hab.* Europe (Switzerland and England).

**R. 1645.** Casts of several associated bones. The originals, which were obtained from the Kimeridge Clay of Ely, Cambridgeshire, are preserved in the Woodwardian Museum at Cambridge, and are portions of the type of *Enaliochelys chelonia*, which is noticed on p. 108 of Seeley's 'Index to Aves &c. in Cambridge Museum.' The casts comprise the 3rd (*a*), 5th (*b*), and 7th (*c*) neurals, an imperfect costal of the right side (*d*), and the crushed left femur (*e*). The neurals agree precisely with the corresponding bones of the type carapace figured by Rütimeyer in the 'N. Denkschr. schw. Ges. Nat.' vol. xxv. art. 2, pl. i., but indicate a slightly smaller individual. The femur precisely resembles No. 46328 in contour, although of somewhat smaller size. As arranged in the Cambridge Museum, the two femora are described as the humeri, while the costals of the right side are referred to the opposite side, and *vice versâ*. The costals do not show the lateral sulci of the vertebral shields. *Made in the Museum*, 1889.

**46326.** The proximal portion of the fourth costal of the right side of the carapace; from the Kimeridge Clay of Devizes,

[1] Verh. schw. Ges. Nat. 1859, p. 57; also N. Denkschr. schw. Ges. Nat. vol. xxv. art. 2, p. 27 (1873).

[2] Index to Aves &c. in Cambridge Museum, p. 108 (1869).—Insufficient description.

[3] N. Denkschr. schw. Ges. Nat. vol. xxv. art. 2, p. 27 (1873).

[4] Index to Aves &c. in Cambridge Museum, p. 108 (1869).

Wiltshir . This specimen agrees precisely with the fourth costal of the type shell figured by Rütimeyer in the 'N. Denkschr. schw. Ges. Nat.' vol. xxv. art. 2, pl. i.; the antero-posterior diameter of this specimen and of the corresponding costal of the type being 0,064 (2·5 inches). Irrespective of its larger dimensions, this specimen is at once distinguished from *Tropidemys* by the unequal size of the facets for the neurals. The smoothness of the shell distinguishes the specimen from most species of *Plesiochelys*, while the peculiar point running down between the 5th neural and 5th costal is a feature found only in the present form. These specimens are specifically the same as the preceding.

*Cunnington Collection. Purchased*, 1875.

**47327.** Several fragments of shell, apparently associated with the preceding, some of which seem to belong to the plastron: from Devizes. *Cunnington Collection.*

**46328.** A right femur; from the Kimeridge Clay of Devizes. This specimen was probably associated with the above-mentioned fragments of the shell obtained from the same locality. It resembles the smaller femur of No. R. 1645. Its length is 0,166 (6·5 inches). *Cunnington Collection.*

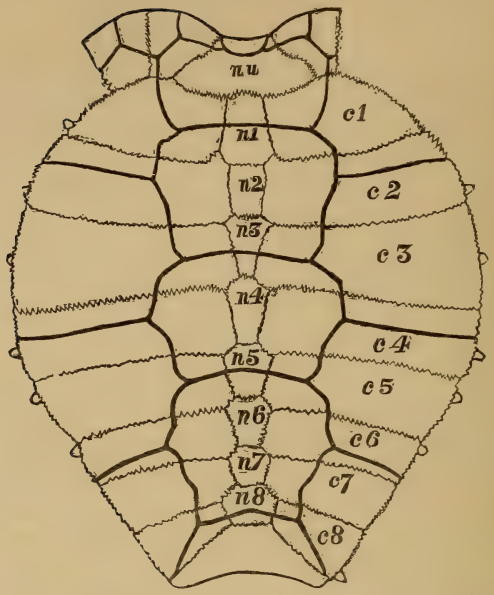
**Thalassemys ruetimeyeri,** Lydekker, n. sp.

Carapace deeply emarginate anteriorly, with the 2nd, 3rd, and 4th vertebral shields widest in front; neurals shorter and wider than in the type species. Size unknown.

*Hab.* Europe (England).

**40676.** (*Fig.*) Slab showing the dorsal aspect of the nearly entire carapace of an immature individual; from the Purbeck of Swanage, Dorsetshire. The type specimen (fig. 36). Noticed by G. A. Boulenger and the present writer in the 'Geol. Mag.' dec. iii. vol. iv. p. 274, and provisionally referred to *Acichelys* (*Eurysternum*). With the exception of the first marginal of either side and the second of the left side, the whole of the peripheral bones are wanting, and the second, third, and fourth neurals are likewise missing. The contour of the vertebral shields is distinctly defined. In their narrowness these shields differ very markedly from those of immature specimens of *Acichelys*. The costals are ossified nearly up to the extremities of the ribs. *Purchased*, 1867.

Fig. 36.




*Thalassemys ruetimeyeri.*—The imperfect carapace; from the Purbeck of Swanage. $\frac{1}{3}$.

## Genus **ACICHELYS,** Meyer[1].

Syn. *Eurysternum,* Wagler[2].
*Aplax,* Meyer[3].
*Euryaspis,* Wagner[4].
*Palæomedusa,* Meyer[5].
*Achelonia,* Meyer[6].

The type genus. Carapace flattened, distinctly emarginate anteriorly, with the costals well ossified and the posterior neurals not forming a tectiform ridge on the carapace; neurals long and more or less distinctly hexagonal, with short antero-lateral surfaces; 5th neural with entire postero-lateral border. Vertebral shields very wide, with the underlying areas more or less distinctly fluted. Marginals long and narrow.

[1] Neues Jahrb. 1854, p. 579; the name does not occur in 1843, p. 585, as often quoted.

[2] In Meyer's Palæologica, p. 103 (1832). Preoccupied by *Eurysternus,* Dalman, Ephem. Entomol. p. 8 (1824). The name does not occur in Wagler's Syst. Amphib. (1830). [3] *Op. cit.* 1843, p. 585.—Inappropriate.

[4] Abh. k.-bay. Ak. Wiss. vol. ix. pt. i. p. 89 (1861).

[5] Fauna der Vorwelt—Rept. Lith. Schiefer, p. 136 (1860). [6] *Ibid.* p. 140.

The above generic types are identified as belonging to one form by Zittel in the 'Palæontographica,' vol. xxiv. art. 5 (1877), who also includes *Parachelys* (*infrà*, p. 195). The genus *Aplax* was founded upon an embryo skeleton, and *Achelonia* upon a specimen of the manus. The name *Aplax* is earlier than *Acichelys*, but is inappropriate, as it was applied on the supposition that there were no costal bones on the ribs.

### Acichelys redenbacheri, Meyer[1].

Syn. *Eurysternum crassipes*, Wagner[2].
*Palæomedusa testa*, Meyer[3].
? *Achelonia formosa*, Meyer[4].
? *Euryaspis radians*, Wagner[5].

The type species. In typical examples the neural bones of the carapace show no distinct antero-lateral facets, and are long and narrow.

If this species be identical with *Eurysternum wagleri*, Meyer[6], that specific name should be adopted, but Rütimeyer doubts if this is the case.

In an immature skeleton of this genus, figured by Zittel in the 'Palæontographica,' vol. xxiv. pl. xxvii., under the name of *Eurysternum wagleri*, Meyer, the neurals have distinct antero-lateral facets. Zittel considers that specimen as specifically identical with the present form; but this difference may indicate a specific distinction. In that case there is no evidence to show whether that specimen is specifically identical with Meyer's *E. wagleri*. Neither in the event of there being two species of the genus, is there any evidence to show to which form *Aplax oberndorferi*, Meyer[7], belongs.

*Hab.* Europe (Bavaria).

**49155.** Cast of a slab of limestone showing the imperfect skeleton of an immature individual. The original was obtained from the Lower Kimeridgian Lithographic stone of Kelheim, Bavaria, and is figured in Meyer's 'Rept. Lith. Schiefer,' pl. xx. fig. 1, as *Palæomedusa testa*, of which it is the type. It is also the type of *Eurysternum crassipes*. As pointed out by Rütimeyer, there are no characters by which this specimen can be distinguished from the types of the present species figured in pls. xix., xxi. of the same work. In

[1] Neues Jahrb. 1854, p. 579.
[2] Gelehrte Anzeiger, vol. xlix. p. 553 (1859).
[3] Fauna der Vorwelt—Rept. Lith. Schiefer, p. 136 (1860).
[4] *Ibid.* p. 140. [5] Abh. k.-bay. Ak. Wiss. vol. ix. pt. i. p. 89 (1861).
[6] In Münster's 'Beiträge z. Petrefactenkunde,' 1st ed. pt. i. p. 75 (1839).
[7] Neues Jahrb. 1843, p. 585. See also Rept. Lith. Schiefer, pl. xviii. fig. 2.

the present specimen the carapace has been crushed almost completely flat. The cranium is distinctly seen to have the temporal fossæ only incompletely roofed over, and the orbits appear to have been approximated to the nares. The flutings on the areas occupied by the vertebral shields are distinctly visible. *Purchased*, 1878.

**49177.** Cast of a slab of limestone showing the middle of an immature carapace apparently referable to this species. The original was obtained from the Lower Kimeridgian of Solenhofen, Bavaria, and is preserved in the Museum at Munich. It is figured by Wagner in the 'Abh. k.-bay. Ak. Wiss.' vol. ix. pl. ii., as *Euryaspis radians*, of which it is the type. It is provisionally referred to the present species by Rütimeyer in the 'N. Denkschr. schw. Ges. Nat.' vol. xxv. art. 2, p. 140. The original contour of the carapace is preserved, and is seen to be distinctly convex. The boundaries of the neural bones are invisible; but the flutings on the area occupied by the vertebral shields are very distinct. The hinder neurals are slightly ridged. *Purchased*, 1878.

**49158.** Cast of a slab showing the dorsal aspect of a young skeleton belonging to the present genus. The original was obtained from the Lithographic Stone of Kelheim, Bavaria, and is figured by Maack in the 'Palæontographica,' vol. xviii. pl. xxxix. (vii.), as *Eurysternum crassipes*. By Rütimeyer it is identified, in the 'N. Denkschr. schw. Ges. Nat.' vol. xxv. art. 2, p. 140, with *Aplax oberndorferi*. Zittel regards it as specifically identical with the young skeleton already mentioned and figured by himself in the 'Palæontographica,' vol. xxiv. pl. xxvii., under the name of *Eurysternum wagleri*. The right humerus shows a very small and imperfectly differentiated head, in which respect it differs from the humerus of *Parachelys*, and resembles the specimens mentioned on p. 157. The peculiar form of the neural bones as given in Maack's figure is probably due to incorrect restoration. *Purchased*, 1878.

## Genus **PELOBATOCHELYS**, Seeley [1].

Imperfectly known, but apparently connecting the preceding with the following genus. Carapace with the costals very thin and im-

[1] Quart. Journ. Geol. Soc. vol. xxxi. p. 234 (1875).

perfectly ossified distally; neurals with short antero-lateral surfaces; middle and hinder neurals forming a strongly marked tectiform ridge, with a chevron-like (∧) cross-section; 5th neural (fig. 37) with postero-lateral surface deeply excavated for the reception of a process of the costal. Vertebral shields broad, with the periphery of the underlying areas very boldly fluted.

On the ventral aspect of the anterior neurals the antero-lateral surfaces become very large, thus indicating an approximation to the next genus.

Fig. 37.

*Pelobatochelys blakei.*—The fifth neural bone; from the Kimeridge Clay of Dorsetshire. ½.

A specimen from the Kimeridge Clay of Weymouth, formerly in the collection of the late Mr. Damon, shows the contour of the entire carapace, although the individual bones are not definable. The contour is cordiform, and the neural region forms a sharp ridge, with the costals sloping away like the sides of a roof.

### **Pelobatochelys blakei,** Seeley [1].

The type and only described species. Attains large dimensions, but is very imperfectly known.

*Hab.* Europe (England).

R. 2. (*Fig.*) Fragment of the anterior portion of the carapace, showing the first three neurals and parts of the adjacent costals, of an immature individual; from the Kimeridge Clay of Weymouth, Dorsetshire. One of the types; figured by Seeley in the 'Quart. Journ. Geol. Soc.' vol. xxxi. pl. xiii. fig. 1. On the ventral aspect the anterior lateral facets of the second and third neurals exceed half the length of the postero-lateral facets; whereas in the type of *Acichelys redenbacheri* figured by Meyer in his 'Rept. Lith. Schiefer,' pl. xxi. fig. 4, there are no distinct antero-lateral facets. *Purchased*, 1880.

[1] Quart. Journ. Geol. Soc. vol. xxxi. p. 234 (1875).

**R. 2 a.** (*Fig.*) Fragment of the carapace of an apparently older individual, showing the 4th, 5th, and 6th neurals, with portions of the 4th and 5th costals; from Weymouth. One of the types; the 4th and 5th neurals and costals are figured by Seeley, *op. cit.* pl. xiii. fig. 1, in conjunction with the preceding specimen. The lateral excavation of the 5th neural, which is traversed by the sulcus dividing the 3rd and 4th vertebral shields, is well shown.

*Purchased*, 1880.

**44177.** (*Fig.*) Part of the carapace of a more nearly adult individual; from Weymouth. This specimen shows the neurals from the fourth to the eighth, with portions of the costals, the last three neurals and costals being completely anchylosed together. It is one of the types; the last three neurals and accompanying fragments of the costals being figured by Seeley, *op. cit.* pl. xiii. fig. 1, in conjunction with the last specimen; they are marked *b* in the figure. The characteristic form of the 5th neural is well shown; the anterior and posterior sulci of the 4th vertebral shield respectively traverse the 5th and 8th neurals, forming a bold transverse depression, preceded by a ridge. The 5th left costal has been fitted to the specimen since it was figured, and shows its imperfect ossification and thinness.

*Purchased*, 1873.

**44177 a.** Fragment of the carapace of a young individual, showing the 5th, 6th, and 7th neurals, and fragments of three of the accompanying costals; from Weymouth. Noticed by Seeley, *op. cit.* p. 234. The 7th neural is short, with relatively long antero-lateral facets. *Purchased*, 1873.

**44177 b.** (*Fig.*) An imperfect peripheral bone of the carapace regarded by Seeley as the pygal; from Weymouth. One of the types; figured, *op. cit.* pl. xiii. fig. 1; marked *c* in figure.

*Purchased*, 1873.

**41235.** (*Fig.*) A marginal bone; from Weymouth. One of the types; figured, *op. cit.* pl. xiii. fig. 1; marked *d* in figure. The pit for the extremity of the rib is well shown.

*Purchased*, 1865.

**44178.** The fifth neural bone of a nearly adult individual; from Weymouth. The excavation of the postero-lateral surfaces and the sulcus of the vertebral shield are well shown.

*Purchased*, 1873.

**41234.** A nearly similar specimen of the fifth neural bone; from Weymouth. *Purchased*, 1868.

**41234 a.** The fifth neural bone of an immature individual; from Weymouth. The sulcus of the vertebral shield is abraded. *Purchased*, 1868.

**44178 a.** A neural bone, probably the seventh, of an immature individual; from Weymouth. *Purchased*, 1873.

**44177 c.** A costal bone, probably the third of the left side of No. 44177; from Weymouth. *Purchased*, 1873.

Genus *non det.*

The undermentioned costals are characterized by the fluting extending over the whole of the proximal portion of the bone, in place of being confined to the periphery of the areas occupied by the vertebral shields, as in the type of *Pelobatochelys*. Some of the figured specimens of *Acichelys* approximate to this arrangement of the sculpture.

**41403.** The proximal portion of a small and probably immature costal; from the Kimeridge Clay of Weymouth, Dorsetshire. *Purchased*, 1869.

**R. 900.** The proximal portion of a much larger costal; from the Wealden of the Isle of Wight. *Fox Collection.* *Purchased*, 1882.

**R. 900 a.** Fragment of a similar costal; from the Wealden of the Isle of Wight. *Fox Collection.*

**R. 290.** Fragment of a similar costal, in matrix; from the Wealden (Hastings group), locality unknown. *Egerton Collection.* *Purchased*, 1882.

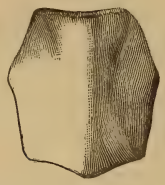
## Genus **TROPIDEMYS**, Rütimeyer[1].

Carapace with the costals well ossified, and the neurals extremely thick; neurals (fig. 38) with the antero- and postero-lateral surfaces subequal, and in the posterior region of the carapace forming a tectiform ridge, with a chevron-like (∧) cross-section; 5th neural not laterally emarginate. Vertebral shields narrow, with the underlying areas smooth. Plastral vacuity tending to obliterate more or less completely.

[1] N. Denkschr. schw. Ges. Nat. vol. xxv. art. 2, p. 27 (1873).

*Tropidemys valanginensis* (Pictet[1]) indicates the survival of the genus to the Neocomian. In a species from the Kimeridgian of Hanover, referred to this genus and figured by Portis[2], it appears that there was a median line of small intervertebral shields.

Fig. 38.



*Tropidemys* (*cf.*) *langi*.—The second neural bone; from the Kimeridge Clay of Dorsetshire. ½.

### **Tropidemys langi,** Rütimeyer[3].

The type species. Carapace very broad and flat anteriorly. Vertebral shields with highly curved anterior and posterior borders.

The following specimens are provisionally referred to this species, but there is no evidence to show that they may not be referable to *T. expansa*, Rüt.[4], or *T. gibba*, Rüt.[5]

*Hab.* Europe (Switzerland, and ? England).

**44178 b.** (*Fig.*) The second neural bone of the carapace; from the Kimeridge Clay (Upper Jurassic) of Weymouth, Dorsetshire. This specimen (fig. 38) indicates a smaller individual than the type specimen, of which the 3rd to the 6th neurals are figured by Rütimeyer in the 'N. Denkschr. schw. Ges. Nat.' vol. xxv. art. 2, pl. vii. fig. 2; it agrees in contour with the 2nd neural of *T. expansa* figured in pl. ix. fig. 3 of the same. *Purchased*, 1873.

**45920.** The first three costals of the right side of a young carapace, not improbably specifically identical with the preceding specimen; from the Kimeridge Clay of Weymouth. The subequal facets for the two lateral surfaces of both the 2nd and 3rd neurals are distinctly shown. The specimen accords well with the larger example of *T. expansa* figured by Rütimeyer, *op. cit.* pl. ix. fig. 3. The contour of portions of the first three vertebral shields is preserved. *Purchased*, 1874.

[1] Matériaux pour la Paléontologie Suisse, sér. 2.—Terrain Crétacé de Ste.-Croix, p. 30, pl. i. (1858–60).

[2] Palæontographica, vol. xxv. art. 3, pl. xv. (1878).

[3] N. Denkschr. schw. Ges. vol. xxv. art. 2, p. 28 (1873).

[4] *Loc. cit.* [5] *Loc. cit.*

**45921.** The first left costal of a nearly adult carapace; from the Kimeridge Clay of Weymouth. The contour of the whole bone, as well as that of the portions of the first and second vertebral shields still remaining, is precisely the same as in the preceding specimen. The relatively large facet for the antero-lateral surface of the first neural at once fixes the generic position of this specimen. The bone is smaller than the first costal of the specimen figured by Rütimeyer, but exhibits the great thickness characteristic of this genus. *Purchased*, 1874.

**42372.** The left hyoplastral of an immature individual belonging either to the present or one of the allied genera; from Weymouth. This specimen closely resembles the hyoplastral of the opposite side figured by Rütimeyer, *op. cit.* pl. ix. fig. 1, and shows the long axillary buttress. *Purchased*, 1870.

*Generically Undetermined Specimens.*

The following specimens of humeri of Mesozoic Chelonians are probably referable to the present family, since they differ from the corresponding bone of the *Plesiochelyidæ* (*vide Parachelys*), and the *Acichelyidæ* appear to be the common forms in the Kimeridge Clay, from which the majority of the undermentioned specimens were obtained. Moreover, they appear to agree with the humerus of *Acichelys* (No. 41958).

**44180.** (*Fig.*) A left humerus; from the Kimeridge Clay of Weymouth, Dorsetshire. Figured in woodcut fig. 1, A (p. 2). This type of bone is characterized by the very imperfect development of the head, and the slight ventral inflection of the radial process. *Purchased*, 1873.

**43033.** The proximal part of a nearly similar left humerus; from Weymouth. Larger than the last. *Purchased*, 1871.

**44180 a.** The proximal part of a similar right humerus; from Weymouth. *Purchased*, 1873.

**44180 b.** The proximal half of an apparently similar humerus; from Weymouth. *Purchased*, 1873.

**45923.** The distal portion of a humerus or femur probably belonging to the same group as the preceding specimens; from Weymouth. *Purchased*, 1874.

**48350.** Slab showing the dorsal aspect of an imperfect humerus of the same general type as the preceding specimens; from the Middle Purbeck of Durdlestone Bay, Dorsetshire.
*Beckles Collection. Purchased*, 1877.

**43570.** The proximal half of a left femur, agreeing in proportions with the above humeri; from the Kimeridge Clay of Weymouth. *Purchased*, 1871.

## Section III. PLEURODIRA.

Shell with the pelvis suturally articulating or anchylosing to the plastron; usually covered with epidermal shields; entoplastral oval or rhomboidal, and not separating the epi- from the hyoplastral; a full series of marginals articulating with the ribs. A mesoplastral present in some forms; and an intergular shield developed in all cases where epidermal shields occur.

In the skull of existing forms (fig. 40) the quadratic articular surface has a concavity for the reception of a condyle on the mandible; the tympanic cavity is completely surrounded by the quadrate, which thus forms an unbroken ring; the pterygoids are very broad and wing-like; the vomer may be absent, so that the palatines may meet in the middle line; and there may be distinct nasals, and a persistent suture in the mandibular symphysis. Cervical vertebræ (when known) with well-developed transverse processes and single terminal articulations; sacral and caudal ribs articulating both with arches and centra of vertebræ. Not more than three phalangeals in the digits. Head (at least in existing forms) retracted by a lateral curvature of the neck.

The labyrinth of the ear is always completely open from behind. The ossification of the shell is generally complete (although there may be persistent vacuities in the plastron), and the axillary and inguinal peduncles of the plastron frequently extend a long distance beneath the costals. In existing forms the neurals never form a continuous series with the suprapygals and pygal, and there is a great tendency to a reduction in the number of the neurals; in Jurassic forms there may, however, be a full series of neurals in connection with the suprapygals. The carapace is always suturally connected with the plastron, and, except in the Triassic *Proganochelys*, there are well-developed axillary and inguinal buttresses. Epidermal shields are present on the shells of all known forms except the *Carettochelyidæ*. The humerus is always of the type shown in

fig. 1, B; having a well-developed head, and comparatively small radial and ulnar processes. It is probable that in the Mesozoic forms the skull approximated towards the Cryptodiran type, since (with the exception of certain forms from the higher Cretaceous of the United States) none of the Chelonian skulls known from these deposits agree with those of existing Pleurodirans, and it is almost certain that some of them are referable to the present section.

The number of phalangeals may be reduced in certain recent (*Pelomedusa*, *Sternothærus*) and also in fossil forms (*Plesiochelyidæ*).

## Family MIOLANIIDÆ.

Shell known only by fragments. Skull (fig. 39) with completely roofed temporal fossæ, and furnished with horn-like bony protuberances; no distinct nasals; vomer dividing palatines; interdentary suture obliterated. Caudal vertebræ opisthocœlous, with chevrons; tail long, and encased in a nodose bony sheath.

According to Boulenger's interpretation the quadratic and palatal regions of the skull have the same general characters as in the following family, although Baur suggests that the closure of the tympanic ring is largely due to dermal ossifications.

### Genus **MIOLANIA**, Owen [1].

Syn. *Megalania*, Owen [2] (*in parte*). *Ceratochelys*, Huxley [3].

The type and only known genus. Cranium with three pairs of peripheral prominences in the fronto-parietal region, of which the anterior pair are small and knob-like, the second pair (horn-cores) large and horn-like, and the third or parietal pair in the form of thin plates nearly meeting one another above the occiput. Double transverse processes to some of the cervical vertebræ, which may have carried ribs. An obtuse angle formed by the junction between the scapula and precoracoid. Humerus with complete foramen. Pelvic bones anchylosed together to form an innominate. Carapace with serrated margins.

Habits probably herbivorous and terrestrial.

The divergent views which have obtained as to the systematic position of this genus, and the confusion of its remains with those of *Varanus* (*Megalania*) *priscus* [4], render it advisable to give a brief summary of the more important literature.

[1] Proc. Roy. Soc. vol. xl. p. 315 (1886). See also Phil. Trans. for 1886, p. 471 (1887).—*Meiolania*.

[2] *Ibid.* for 1880, p. 1037.

[3] Proc. Roy. Soc. vol. xlii. p. 237 (1887).

[4] *Vide suprà*, pt. I. p. 284.

Huxley, T. H.—"Preliminary Note on the Fossil Remains of a Chelonian Reptile (*Ceratochelys sthenurus*) from Lord Howe's Island, Australia," 'Proc. Roy. Soc.' vol. xlii. pp. 232–238 (1887).—Shows that the skull and caudal sheath referred to *Megalania* (*Varanus*), and the whole of the remains described as *Miolania*, are Chelonian; and considers them as indicating a Cryptodiran genus allied to the *Chelydridæ*, for which the name *Ceratochelys* is proposed.

Boulenger, G. A.—"On the Systematic Position of the genus *Miolania*, Owen (*Ceratochelys*, Huxley)," 'Proc. Zool. Soc.' 1887, pp. 554–555.—Considers that there is no justification for the suppression of the name *Miolania* in favour of *Ceratochelys*, and regards the genus as the type of a family of Pleurodira; the chief arguments in favour of its Pleurodiran affinities being the form of the pterygoids, the complete tympanic ring, the nature of the mandibular articulation, and the presence of long transverse processes to the cervical vertebræ.

Woodward, A. S.—"On the Extinct Reptilian Genera *Megalania*, Owen, and *Meiolania*, Owen," 'Ann. Mag. Nat. Hist.' ser. 6, vol. ii. pp. 85–89 (1888).—Gives a summary of previous observations, and proposes the new name *Miolania oweni*.

Owen, R.—"On Parts of the Skeleton of *Meiolania platyceps* (Ow.)," 'Phil. Trans.' 1888, pp. 181–191, pls. xxxi.–xxxvii.—After describing several specimens, maintains the view that both *Megalania* and *Miolania* are allied forms, and concludes that they represent a Suborder displaying affinities both with Saurians and Chelonians, for which the name *Ceratosauria* is proposed. That term had, however, previously been employed by Marsh ('Rep. Brit. Assoc.' for 1884, p. 765, and 'Nature,' Nov. 20, 1884) for a group represented by the Dinosaurian genus *Ceratosaurus*.

Baur, G.—"The Systematic Position of *Meiolania*, Owen," 'Ann. Mag. Nat. Hist.' ser. 6, vol. iii. pp. 54–62 (1889).—Concludes that the genus is Cryptodiran and should be referred to the *Testudinidæ*, considering that the cervical vertebræ resemble those of *Testudo*, and that the roofing of the temporal fossæ and closure of the tympanic ring are due solely to dermal ossification.

Boulenger, G. A.—"Remarks in reply to Dr. Baur's article on the Systematic Position of *Miolania*," 'Ann. Mag. Nat. Hist.' ser. 6, vol. iii. pp. 138–141 (1889).—Adduces arguments supporting his previous paper as to the Pleurodiran nature of this genus, most importance being attached to the first two cervical vertebræ (figures of those of other genera being given for comparison) and to the palatal and quadratic regions of the skull.

Perhaps the acquisition of the plastron may be necessary before we can be absolutely certain as to the Pleurodiran nature of *Miolania*; but, in the first place, distributional evidence is very strongly in favour of this view, while the osteological evidence adduced by Boulenger seems still more so. That the genus represents a distinct family there can be no question whatever.

### Miolania platyceps, Owen [1].

Syn. *Miolania minor*, Owen [2].
*Ceratochelys sthenurus*, Huxley [3].

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[1] Proc. Roy. Soc. vol. xl. p. 315 (1886). See also Phil. Trans. for 1886, p. 471 (1887).

[2] *Loc. cit.*

[3] Proc. Roy. Soc. vol. xlii. p. 237 (1887).

The type species. Skull much smaller than that of *M. oweni*, with the second pair of peripheral protuberances (horn-cores) stout, conical, and directed upwards, backwards, and more or less outwards; anterior pair quite distinct from second pair; parietal pair of moderate size; frontal region broad and flat, without distinctly defined tuberosities. Terminal segments of caudal sheath elongated, with the protuberances of adjacent segments comparatively small and widely separated from one another.

*Hab.* Lord Howe Island, Australasia.

*The following specimens, or their originals, were obtained in a superficial coral-sand deposit in the island mentioned, which may be of Pleistocene age.*

**R. 675.** (*Fig.*) The imperfect cranium. The type specimen. Figured by Owen in the 'Phil. Trans.' for 1886, pl. xxx. fig. 1, and pl. xxxi. fig. 1; and also by Huxley in the 'Proc. Roy. Soc.' vol. xlii. p. 235, fig. 3. The "horn-core" of the left side is entire and directed mainly upwards and backwards. The right quadrate and the palatal ridges of the left side are likewise well shown.

*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 675 a.** (*Fig.*) The "horn-core" of the right side. Figured by Owen, *op. cit.* pl. xxx. fig. 2. *Presented by R. Fitzgerald, Esq.*, 1885.

**R. 675 b.** Part of the right side of the parieto-frontal region, showing the three protuberances. The "horn-cores" are largely directed outwards, as in the following specimens.

*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 906.** Cast of the nearly entire skull, with the first two cervical vertebræ and the hyoids still attached. The original, which is preserved in the Museum at Sydney, is figured by Owen in the 'Phil. Trans.' for 1888, pls. xxxi., xxxii. The mandible is retained in its natural position, and the whole of the palatal surface is exposed. Remarks on the structure of the palate and the relations of the cervical vertebræ are made by Boulenger in the 'Ann. Mag. Nat. Hist.' ser. 6, vol. iii. pp. 139, 141.

*Made in the Museum*, 1887.

**R. 907.** Cast of the posterior portion of the cranium. The original of this specimen, which is of larger size than the preceding, is preserved in the Museum at Sydney, and is figured by Owen, *op. cit.* pls. xxxiii., xxxiv.

*Made in the Museum*, 1887.

**R. 682.** Part of the hinder region of the cranium. The tympanic ring and the base of the horn-core of the left side are preserved; while the basioccipital region is entire. The open stapedial canal and the articular surfaces of the quadrates are well displayed.

*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 675 c.** A number of detached "horn-cores" and other prominences of the cranium.

*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 1594.** Cast of a right "horn-core." The original is preserved in the Museum at Sydney.

*Presented by E. P. Ramsay, Esq.*, 1888.

**R. 1594 a.** Cast of a smaller right "horn-core." The original is preserved in the Museum at Sydney.

*Presented by E. P. Ramsay, Esq.*, 1888.

**R. 675 d.** Fragment of the cranium.

*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 677.** The anterior portion of the left maxilla.

*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 677 a.** The imperfect anterior portion of the left maxilla.

*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 677 b.** Fragment of the right maxilla.

*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 1594 c.** Cast of a slightly imperfect cervical vertebra. The original is preserved in the Museum at Sydney, and is figured by Owen in the 'Phil. Trans.' for 1888, pl. xxxv. figs. 1–3, as a dorsal. There are two transverse processes, the upper one being situated in part upon the neural arch; there is no hæmal spine. Cervical ribs may have been present. This vertebra is readily distinguished from the cervicals of Crocodiles by the peculiar upward flexure of the superior surface of the neural arch, and the absence of a hæmal spine.

*Presented by E. P. Ramsay, Esq.*, 1888.

**R. 689.** The neural arch of a similar cervical vertebra.

*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 693.** The imperfect centrum of a large (late?) cervical vertebra. There is a hæmal carina; and there was probably but one transverse process.

*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 678.** An imperfect cervical vertebra, agreeing in structure with the preceding. The single transverse process is well shown.
*Presented by R. Fitzgerald, Esq.*

**R. 1594 d.** Cast of a biconvex vertebral centrum, which may belong to the cervical region. Original figured by Owen in the 'Phil. Trans.' for 1888, pl. xxxv. fig. 4, as the first caudal; preserved in the Museum at Sydney.
*Presented by E. P. Ramsay, Esq.*, 1888.

**R. 1594 e.** Cast of an imperfect caudal vertebra. The original is preserved in the Museum at Sydney, and has lost both transverse processes.
*Presented by E. P. Ramsay, Esq.*, 1888.

**R. 1594 f.** Cast of a slightly imperfect caudal vertebra. The original, which is preserved in the Museum at Sydney, is figured by Owen in the 'Phil. Trans.' for 1888, pl. xxxv. fig. 6 (reversed). *Presented by E. P. Ramsay, Esq.*, 1888.

**R. 1594 g.** Cast of the centrum and chevron of a caudal vertebra. The original is in the Sydney Museum.
*Presented by E. P. Ramsay, Esq.*, 1888.

**R. 1594 h.** Cast of the centrum and chevron of a later caudal vertebra. The original is preserved in the Museum at Sydney. The centrum is longer than in the preceding specimen. *Presented by E. P. Ramsay, Esq.*, 1888.

**R. 678 a.** An imperfect caudal vertebra. The anterior extremity of the centrum is wanting, and the processes are imperfect.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 678 b.** The posterior portion of the centrum of a large caudal vertebra. The ridges for the chevrons are shown.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 678 c.** The imperfect posterior portion of the centrum of a caudal vertebra. *Presented by R. Fitzgerald, Esq.*, 1885.

**R. 693 a.** The centrum of a late caudal vertebra. This specimen is greatly elongated.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 678 d.** The imperfect posterior extremity of the centrum and chevron of a late caudal vertebra.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 690.** An imperfect late caudal vertebra, in matrix.
*Presented by R. Fitzgerald Esq.*, 1885.

R. 679. (*Fig.*) The imperfect terminal extremity of the caudal sheath, exhibiting some of the enclosed vertebræ. Figured by Owen in the 'Phil. Trans.' for 1886, pl. xxxi. fig. 3.

*Presented by R. Fitzgerald, Esq.*, 1885.

R. 680. (*Fig.*) Part of the terminal extremity of the caudal sheath, showing vertebræ. Figured by Owen, *l. c.* pl. xxxi. fig. 4.

*Presented by R. Fitzgerald, Esq.*, 1885.

R. 908. Cast of the terminal portion of the caudal sheath of a larger individual, showing one vertebra *in situ*. The original is preserved in the Museum at Sydney, and is figured by Owen in the 'Phil. Trans.' for 1888, pl. xxxvii.

*Made in the Museum*, 1887.

R. 1594 k. Cast of a dermal bone, which is probably part of one of the proximal rings of the caudal sheath. The original is preserved in the Museum at Sydney, and is figured by Owen in the 'Phil. Trans.' for 1888, pl. xxxvi. figs. 7–9, as the sternal arch.

*Presented by E. P. Ramsay, Esq.*, 1888.

R. 1594 l. Cast of a dermal bone probably belonging to the caudal sheath. The original is in the Museum at Sydney.

*Presented by E. P. Ramsay, Esq.*, 1888.

R. 1594 m. Cast of a dermal bone. This specimen has a surface for sutural articulation at either extremity, like a marginal of the carapace, but is more curved, and has no sulcus of epidermal shields. It may belong to the caudal sheath. The original is in the Museum at Sydney.

*Presented by E. P. Ramsay, Esq.*, 1888.

R. 1594 n. Cast of a dermal bone. The original is preserved in the Museum at Sydney, and is figured by Owen in the 'Phil. Trans.' for 1888, pl. xxxvi. fig. 10, as one of the body-scutes. It may have been one of the scutes on the limbs, corresponding to the smaller ones found in many of the large species of *Testudo*.

*Presented by E. P. Ramsay, Esq.*, 1888.

R. 1594 o. Cast of one of the free marginals of the carapace. The original is preserved in the Museum at Sydney. It shows the sulcus between two marginal shields, and also indicates that the extremities of the carapace were serrated.

*Presented by E. P. Ramsay, Esq.*, 1888.

**R. 1594 p.** Cast of a free marginal. Original in Sydney Museum. The serration is very strongly marked.
*Presented by E. P. Ramsay, Esq.*, 1888.

**R. 683** and **693 x.** A series of fragmentary bones mostly belonging to the shell or the caudal sheath.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 693 d.** The left precoracoid, wanting the glenoidal extremity.
*Presented by R. Fitzgerald, Esq.*, 1888.

**R. 693 b.** The glenoidal extremity of the left scapulo-precoracoid.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 686.** The glenoidal region of a smaller left scapulo-precoracoid. The coracoidal facet is eroded.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 693 c.** The distal portion of the right humerus. In its relatively large size and mineral condition this specimen agrees with No. R. 693 *b*, and therefore probably belonged to the same individual. The contour of the articular surface approximates to that of *Podocnemis*, and is totally unlike *Testudo*.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 684.** The imperfect distal portion of a smaller left humerus. The ectepicondylar foramen is well shown.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 1594 i.** Cast of the left radius. The original, which is preserved in the Museum at Sydney, is figured by Owen in the 'Phil. Trans.' for 1888, pl. xxxvi. figs. 5, 6.
*Presented by E. P. Ramsay, Esq.*, 1888.

**R. 693 e.** The imperfect left innominate. A large portion of the ilium remains, although its distal extremity is wanting. The acetabulum is nearly entire, and shows that the three elements which enter into its formation are completely joined together.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 687.** The imperfect right innominate of a rather larger individual.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 693 f.** An imperfect bone which is probably the proximal part of the left ilium of a small individual.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 693 g.** A corresponding imperfect bone of the opposite side.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 684 a.** The distal extremity of the left femur.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 684 b.** The imperfect distal half of a larger left femur.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 684 c.** The imperfect distal half of a smaller left femur.
*Presented by R. Fitzgerald, Esq.*, 1885.

**R. 685.** The right tibia. *Presented by R. Fitzgerald, Esq.*, 1885.

**R. 1594 j.** Cast of the left tibia. The original is preserved in the Museum at Sydney, and is figured by Owen in the 'Phil. Trans.' for 1888, pl. xxxvi. figs. 1–4.
*Presented by E. P. Ramsay, Esq.*, 1888.

**R. 681.** Mass of matrix containing several bones, mostly imperfect. There is one nearly entire caudal vertebra; and there are also remains of portions of the pelvis.
*Presented by R. Fitzgerald, Esq.*, 1885.

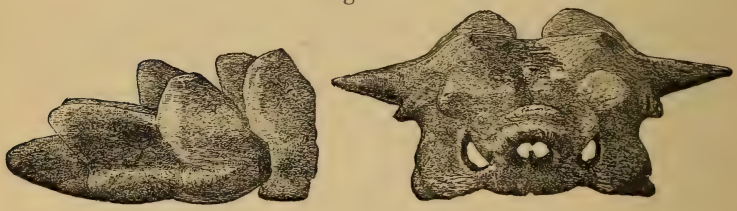
**R. 693 i.** A nearly entire bone which may be a cervical rib. This bone has a single articular head, below which it expands into a flat plate, with a hooked prominence on one border.
*Presented by R. Fitzgerald, Esq.*, 1885.

### **Miolania oweni,** Smith Woodward [1].

Syn. *Megalania prisca,* Owen [2] (*in parte*).
*Ceratochelys sthenurus,* Huxley [3] (*in parte*).

Of very large dimensions, the transverse diameter of the cranium

Fig. 39.



A B

*Miolania oweni.*—Right lateral aspect of the extremity of the caudal sheath (A), and anterior aspect of the cranium (B); from the Pleistocene of Queensland. Much reduced. (*After Owen.*)

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[1] Ann. Mag. Nat. Hist. ser. 6, vol. i. p. 89 (1888).
[2] Phil. Trans. 1880, p. 1041. [3] Proc. Roy. Soc. vol. xlii p. 237 (1887).

in advance of the larger peripheral protuberances being 0,305 (12 inches). Skull with the second pair of peripheral protuberances (horn-cores) flattened and directed outwardly; anterior pair approximated to the base of the second pair; parietal pair very large; frontal region occupied by three pairs of nodose tuberosities. Terminal segments of caudal sheath short, with the protuberances of adjacent segments very large and closely approximated.

*Hab.* Australia (Queensland).

**R. 391.** (*Fig.*) The imperfect cranium; from the Pleistocene of King's Creek, Condamine River, Queensland. The type specimen (fig. 39, B); figured by Owen in the 'Phil. Trans.' 1880, pls. xxxvii. & xxxviii., and referred to *Varanus* (*Megalania*) *priscus*; noticed by Huxley, 'Proc. Roy. Soc.' vol. xlii. p. 237. The palatal region is wanting, but the outer half of the right quadratic condyle still remains; the missing portions of the frontal aspect have been restored in plaster since the specimen was figured.

*Presented by G. F. Bennett, Esq.*, 1880.

**R. 392.** (*Fig.*) The termination of the caudal sheath; from the Pleistocene of King's Creek. Probably associated with the preceding specimen. This specimen (fig. 39, A) is figured by Owen in the 'Phil. Trans.' 1881, pls. lxiv. & lxv. (as *Megalania prisca*), and noticed by Huxley, *loc. cit.* It comprises one free ring, and two coalesced rings anchylosed to the terminal cap. *Presented by G. F. Bennett, Esq.*, 1881.

## Family CHELYIDÆ[1].

Shell comparatively thin, without mesoplastrals, and with a reduced number of neurals and suprapygals; both pubis and ischium uniting with xiphiplastral. No inframarginal shields. Skull without quadratojugal, and with open temporal fossæ and a parietosquamosal arch; prefrontals separated by frontals; distinct nasals (except in *Chelys*); vomer dividing palatines; a persistent interdentary suture. 5th and 8th cervical vertebræ biconvex. Number of phalangeals normal. Coracoid more or less expanded distally. Caudal vertebræ procœlous, without chevrons; tail short. The quadratic and palatal regions of the skull have the characters mentioned under the head of the section.

[1] Usually incorrectly given as *Chelydidæ*, but the word χέλυς has the genitive χέλυος.

## Genus **CHELODINA**, Fitzinger[1].

For the characters of this genus see Boulenger, 'Catalogue of Chelonians,' &c. p. 213. It may be remarked that neural bones are absent, and that the outer surface of the shell is more or less distinctly vermiculated; a neural shield being always present.

### Chelodina longicollis (Shaw[2]).

Syn. *Testudo longicollis*, Shaw[3].

In this, the type, species the shell is thick, with the vermiculations strongly marked, and the sulci dividing the epidermal shields very deeply impressed; the nuchal shield is long and narrow.

*Hab.* Australia (southern half).

**48473.** An imperfect nuchal bone; from the Pleistocene of Westbrook, a tributary of Oakey Creek, which runs into the Condamine river, Queensland. This specimen cannot be distinguished from the nuchal bone of the existing form, showing the same long and narrow nuchal shield; it may, however, be referable to *C. expansa*, which has a similar nuchal shield. *Presented by Dr. George Bennett.*

**R. 616.** The tenth marginal bone of the right side, belonging either to the present or a closely allied form; from the Pleistocene of Eton Vale, Darling Downs, South Queensland. This specimen shows the sulcus dividing two marginal shields, and also the sulci dividing these marginals from the last costal and fifth vertebral shields.

*Presented by Dr. George Bennett*, 1885.

**R. 617.** A small right humerus which may belong to the present or an allied form; from the Pleistocene of Eton Vale.

*Presented by Dr. George Bennett*, 1885.

## Genus **EMYDURA**, Bonaparte[4].

For the characters of this genus see Boulenger, 'Catalogue of Chelonians,' &c. p. 228. It may be observed that the shell is usually more or less distinctly vermiculated, but that the sulci marking the

[1] N. Class. Rept. p. 6 (1826).
[2] General Zoology, vol. iii. p. 62 (1802).—*Testudo.*
[3] *Loc. cit.*
[4] Arch. f. Naturgeschichte, 1838, vol. i. p. 140.

boundaries of the epidermal shields are much less deeply marked than in *Chelodina*. The nuchal shield may be wanting.

### Emydura macquariæ (Gray [1]).

Syn. *Hydraspis macquarii*, Gray [2].

The type species. Shell more or less depressed, with the posterior portion expanded, and either entire or slightly serrated; a large nuchal shield; outer surface marked either by rugosities or vermicular impressions.

*Hab.* South-eastern ( and [?] North-western) Australia.

**R. 1593.** An imperfect eighth marginal bone of the right side, belonging either to this or an allied species; apparently from the Pleistocene cave-deposits of New South Wales. This specimen indicates a larger individual than any recent examples in the Museum, but, in the absence of well-marked specific points of distinction, is provisionally referred to the same species. The free portion is, however, relatively narrower than in existing specimens.

*No history.*

**42684.** An imperfect right tenth marginal, probably referable to the same species as the preceding; from the Pleistocene cave-deposits of the Wellington Valley, New South Wales. This specimen appears to include part of the eighth costal.

*Presented by the Trustees of the Australian Museum*, 1870.

## Genus **HYDRASPIS**, Bell [3].

Typically neural bones six in number, of which the second and third have short antero-lateral surfaces; a nuchal shield, which is marginal in position. Plastron large, with strong axillary and moderate inguinal buttresses, the latter anchylosed to the fifth costal; xiphiplastrals deeply notched.

For other characters and synonymy see Boulenger, 'Catalogue of Chelonians,' &c., pp. 219, 220.

This genus is now confined to South America.

[1] Synopsis Reptilium, p. 40 (1831).—*Hydraspis.* [2] *Loc. cit.*

[3] Zool. Journ. vol. iii. p. 511 (1828).

### **Hydraspis leithi** (Carter[1]).

Syn. *Testudo leithi*, Carter[2]. *Platemys leithi*, Lydekker[4].
*Hydraspis leithi*, Gray[3].

Imperfectly known, but apparently nearly allied to existing forms. In the type specimen, which is of comparatively small size, the last five neural bones are shown; the omission of a nuchal shield in the restoration of the anterior border of the carapace is probably incorrect.

The type specimen was obtained from the intertrappean Eocene beds of Bombay[5].

*Hab.* India (Bombay and Central Provinces).

**R. 1728.** Cast of an imperfect right epiplastral probably belonging to this species. The original, which is preserved in the Museum of the Geological Society, was obtained from the intertrappean Eocene beds near Nagpur, Central Provinces, by the late Rev. S. Hislop. It shows one half of the area occupied by the intergular shield, and the whole of that covered by the right gular. Besides its larger dimensions (which somewhat exceed those of average-sized examples of the existing *H. hilarii*), this specimen differs from the type shell figured by Carter by the relatively larger gulars and narrower intergular; but since specimens of *H. hilarii* show similar variations this cannot be regarded as a specific character. The specimen will be figured by the writer in the 'Rec. Geol. Surv. Ind.' for 1890. *Made in the Museum*, 1889.

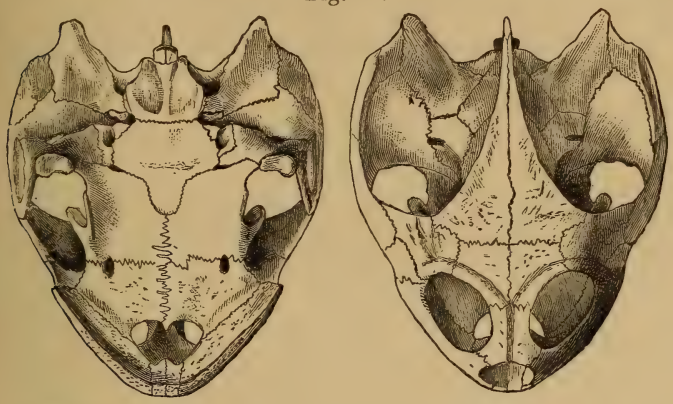
## Family PELOMEDUSIDÆ.

Shell frequently thick, with mesoplastrals and a reduced number of neurals and suprapygals; both pubis and ischium uniting with xiphiplastral. No inframarginal shields. Skull (fig. 40) with quadratojugal, and either open or roofed (*Podocnemis*) temporal fossæ, and no parieto-squamosal arch; prefrontals in contact, and fused with nasals; vomer absent in recent forms; interdentary suture obliterated. 2nd cervical vertebra amphicœlous. Number of phalangeals reduced in some forms. Coracoid narrow throughout. Caudal vertebræ as in preceding family.

[1] Journ. Bombay As. Soc. vol. iv. p. 186 (1852).—*Testudo*.
[2] *Loc. cit.* This name preoccupies *T. leithi*, Günther, 1869.
[3] Ann. Mag. Nat. Hist. ser. 4, vol. viii. p. 339 (1871).
[4] Rec. Geol. Surv. Ind. vol. xx. p. 66 (1887).
[5] See Medlicott and Blanford, Manual of Geology of India, p. 321 (1879).

The skull has the characters mentioned under the head of the section. The mesoplastrals may be either complete (*Sternothærus*) or incomplete (*Podocnemis*). Cope regards *Stenothærus* as the type of a family, on account of the complete mesoplastrals.

Fig. 40.



*Pelomedusa galeata*.—Palatal and frontal aspects of the cranium. (From Boulenger's 'Catalogue of Chelonians.')

## Genus **PODOCNEMIS,** Wagler [1].

Including *Peltocephalus,* Duméril & Bibron [2].

Mesoplastral bones small, lateral, and wedged in between the hyo- and hypoplastrals (fig. 41); plastron large, with strong buttresses, devoid of hinge, and with notched xiphiplastrals; humero-pectoral sulcus cutting entoplastral bone. Neural bones elongated, 7 in number, hexagonal, with short antero-lateral surfaces. No nuchal shield; vertebral shields hexagonal, with straight lateral borders, and not narrowed posteriorly. The caudal shield may be single. Skull with complete temporal roof; the quadratojugal uniting suturally with the parietal; edges of jaws not serrated.

### **Podocnemis bowerbanki** (Owen [3]).

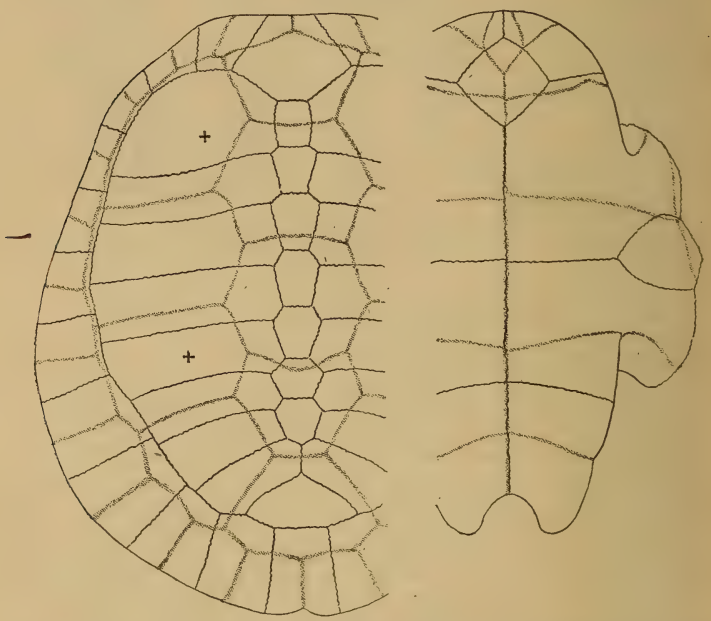
Syn. *Platemys bowerbanki,* Owen [4].
*Emys lævis,* Bell [5].
*Podocnemis bowerbanki,* Cope [6].
*Podocnemis lævis,* Cope [7].
*Peltocephalus lævis,* Rütimeyer [8].

[1] Syst. Amphib. p. 135 (1830).
[2] Erpétologie Générale, vol. ii. p. 577 (1835).
[3] Rep. Brit. Assoc. for 1841, p. 163 (1842).—*Emys.* [4] *Loc. cit.*
[5] Reptilia of the London Clay &c. (Mon. Pal. Soc.), vol. i. pt. i. p. 70 (1849).
[6] Trans. Amer. Phil. Soc. vol. xiv. pt. i. p. 156 (1870). [7] *Loc. cit.*
[8] N. Denkschr. schw. Ges. Nat. vol. xxv. art. 2, p. 159 (1873).

Apparently nearly allied to the existing forms. The vertebral shields are relatively wide, with acute lateral angles; the 3rd vertebral embracing three neural bones.

The identity of *Emys lævis* with this species was first pointed out by Rütimeyer (*l. c.*). The skull provisionally referred by Owen to this species is noticed under the heading of *Pseudotrionyx*. *P. indica*, Lydekker[1], differs from the present species by the narrower vertebral shields, of which the 4th overlies four neural bones, as in the existing *P. sextuberculata* (fig. 41).

Fig. 41.



*Podocnemis sextuberculata*.—Carapace and plastron: reduced. The + + indicate the terminations of the axillary and inguinal buttresses. (From Boulenger's 'Catalogue of Chelonians.')

The type specimen, which is figured by Owen in his 'Reptilia of the London Clay &c.,' vol. i. pl. xxiii., was formerly in Mr. Bowerbank's collection, but since it was not sent to the Museum with that collection it is probable that it must have perished through pyritous decomposition.

*Hab.* Europe (England).

[1] Palæontologia Indica, ser. 10, vol. iv. p. 63 (1887).

**37209.** (*Fig.*) The imperfect shell of an immature individual; from the London Clay (Lower Eocene) of the Isle of Sheppey. Figured by Bell in the 'Reptilia of the London Clay, &c.' vol. i. pl. xxii., as *Emys lævis*, of which it is the type. The relatively greater width of the vertebral shields as compared with the type specimen is merely due to the immaturity of the specimen.

*Bell Collection. Purchased*, 1863.

## Genus **DACOCHELYS**, Lydekker[1].

Founded on the mandible, which is characterized by the presence of a large triangular process on the oral surface of the symphysis, and the serration of both the alveolar edge and an inner ridge. The general contour of this mandible approximates to that of *Podocnemis*, on which ground the genus is placed here.

The shell which, from its large size, is provisionally referred to this genus, presents the general characters of *Podocnemis*; but the vertebral shields have curved lateral borders, and are narrowed posteriorly, so that their contour becomes somewhat balloon-shaped.

### **Dacochelys delabechei** (? Bell).

Syn. (?) *Emys delabechei*, Bell[2].
=*Emys conybeari*, Owen[3].
=*Podocnemis* (?) *delabechei*, Lydekker & Boulenger[4].

The type species. Fully equal in size to *Podocnemis expansa*.
*Hab.* Europe (England).

**39257.** (*Fig.*) The imperfect anterior portion of the mandible; from the London Clay (Lower Eocene) of the Isle of Sheppey. The type of the genus; described and figured by the writer in the 'Quart. Journ. Geol. Soc.' vol. xlv. p. 241, fig. 6.

*Purchased*, 1865.

**39449.** (*Fig.*) An imperfect shell, provisionally referred to this genus; from Sheppey. Described and figured by Owen in his 'Reptilia of the London Clay &c.' vol. i. pt. i. Suppl. i. p. 77, pls. xxviii. A. and xxviii. B, as *Emys conybeari*, of which it is the type. As noticed by Boulenger and the

[1] Quart. Journ. Geol. Soc. vol. xlv. p. 241 (1889).
[2] Reptilia of London Clay, &c. (Mon. Pal. Soc.), vol. i. pt. i. p. 74 (1849).
[3] *Ibid.* Suppl. i. p. 77 (1858).
[4] Geol. Mag. dec. iii. vol. iv. p. 275 (1887).

present writer, in the 'Geol. Mag.' dec. iii. vol. iv. p. 275, this shell is evidently specifically identical with the smaller specimen represented in pl. xxviii., which is the type of *Emys delabechei*, the latter specimen having probably now perished through pyritous decomposition. The present specimen shows the presence of mesoplastrals placed as in *Podocnemis*; the matrix has been chiselled away in order to exhibit the anchylosis of the ischium and pubis to the xiphiplastral. If not referable to the present genus, this specimen should be placed in *Podocnemis* as a species differing from the others in the contour of the vertebral shields. *Bowerbank Collection. Purchased*, 1865.

## Genus **TAPHROSPHYS**, Cope[1].

This genus, which may be identical with the earlier *Bothremys* of Leidy[2], occurs typically in the Upper Cretaceous of New Jersey, and is described as being closely allied to *Podocnemis*. In the skull on which *Bothremys* was founded there is, however, a distinct vomer.

In the American forms the humerus seems to be unknown; the type specimens are described by Cope in the 'Trans. Amer. Phil. Soc.' vol. xiv. pt. i. p. 157 *et seq.* (1870).

### **Taphrosphys ?**, sp.

The following specimen indicates a form somewhat exceeding in size the largest specimen of *Podocnemis expansa* in the collection of the Museum, and apparently indicates an allied form which, from its geological horizon, may probably be referred to the present genus.

*Hab.* New Zealand.

**R. 73.** The imperfect right humerus; from beds of Upper Cretaceous age in New Zealand. The head and the whole of the distal extremity are wanting, but the upper part of the ectepicondylar groove still remains. In the contour of the proximal portion, as well as in the constricted shaft, which is almost narrowed into a ridge on the posterior aspect, this bone agrees so closely with the humerus of

[1] Amer. Nat. vol. iii. p. 90 (1869).

[2] Cretaceous Reptiles of United States (Smiths. Contrib. Knowl. vol. xiv. art. 6), p. 110 (1865).

*Podocnemis*, that there can be but little hesitation in referring it to the same family.

*Transferred from the Museum of Practical Geology*, 1881.

### Family Position Uncertain.

The undermentioned genus is definitely known only by the skull, and its serial position must remain uncertain till either the complete shell is known or until we gain definite knowledge of the skull of the *Plesiochelyidæ*. On account of the presence of distinct nasals and the meeting of the palatines in the middle line, the genus has been provisionally referred by the writer [1] to the Pleurodira. This reference is confirmed by the characters of the humerus No. R. 402 (p. 175). The Portlandian skull, to which the name *Stegochelys* [2] has been provisionally applied, differs from that of *Rhinochelys* by the median union of the prefrontals, the incomplete temporal roof, and the emargination of the lower border of the inferior temporal arcade. A large number of specific names were applied by Seeley [3] to crania of *Rhinochelys* in the Cambridge Museum; but since these are unaccompanied by any description, they can only rank as MS. ones. If rightly referred to the Pleurodira, the skull of *Rhinochelys* shows an approximation to the Cryptodiran type.

## Genus **RHINOCHELYS**, Seeley [4].

Skull with the temporal fossæ completely roofed over, after the manner of the *Chelonidæ*, a post-temporal (parieto-squamosal) bar being probably present, in some cases at least; pterygoids narrow and emarginate; palatines meeting in the middle line; vomer [5] dividing posterior nares and connecting palatines with premaxillæ. Distinct nasals; prefrontals separated by nasals and frontals; jugal continuing line of alveolar border of maxilla to tympanum; quadratojugal entering into formation of tympanic ring, which appears to have been notched inferiorly. Palate with a ridge on either side of oral surface; mandible with the interdentary suture obliterated, and a prominent oral ridge.

[1] Quart. Journ. Geol. Soc. vol. xlv. p. 227 (1889).
[2] *Ibid.* p. 229. See Addenda.
[3] Index to Aves &c. in Cambridge Museum, pp. xviii, xix (1869).
[4] *Op. cit.* p. 25 (1869).
[5] *Teste* Seeley. See also Quart. Journ. Geol. Soc. vol. xlv. p. 228.

### **Rhinochelys pulchriceps** (Owen [1]).

Syn. *Chelone pulchriceps*, Owen [2].

The type species. Skull depressed, with very prognathous muzzle, and a long interval between tympanic ring and extremity of premaxillæ; palatal ridges very prominent; prefrontals excluded from nares, which are of medium dimensions; nasals of moderate size.

*Hab.* Europe (England).

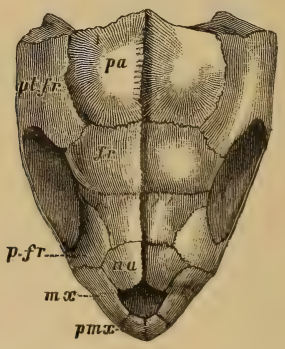
**R. 1502.** Cast of the imperfect cranium. The original, which was obtained from the Cambridge Greensand, and is in the collection of T. Jesson, Esq., of Northampton, is figured by the writer in the 'Quart. Journ. Geol. Soc.' vol. xlv. pl. viii. figs. 1, 1 *a*. This specimen, although somewhat flattened by pressure, agrees closely with the somewhat larger type cranium figured by Owen in his 'Cretaceous Reptilia' (Mon. Pal. Soc.), pt. i. pl. vii. A. figs. 1–3, showing the same depressed form, with the prognathous muzzle and the very prominent palatal ridges.

*Made in the Museum*, 1889.

### **Rhinochelys cantabrigiensis,** Lydekker [3].

Skull more vaulted than in *R. pulchriceps*, with a much less

Fig. 42.




*Rhinochelys cantabrigiensis.*—Frontal aspect of the cranium, imperfect posteriorly; from the Cambridge Greensand. ½. *pm.x*, premaxilla; *mx*, maxilla; *na*, nasal; *p.fr*, prefrontal; *fr*, frontal; *pt.fr*, postfrontal; *pa*, parietal.

[1] Rep. Brit. Assoc. for 1841, p. 172 (1842).—*Chelone.* [2] *Loc. cit.*
[3] Quart. Journ. Geol. Soc. vol. xlv. p. 230 (1889).

produced muzzle, a shorter interval between the latter and the tympanic ring, and with relatively wider nasals and apparently less prominent palatal ridges.

*Hab.* Europe (England).

**43980.** (*Fig.*) The cranium, imperfect posteriorly, and with the palate obscured by phosphate; from the Cambridge Greensand. The type (fig. 42); figured by the writer in the 'Quart. Journ. Geol. Soc.' vol. xlv. pl. viii. figs. 2, 2 *a*, 2 *b*. Compared with the figure of the type of *R. pulchriceps*, this specimen exhibits the specific characters of the more vaulted cranium, the much less prognathous premaxillæ, and the shorter interval between the latter and the anterior border of the tympanic ring, as well as the greater relative width of the nasals. The greater part of the quadrate is preserved, which seems to show that the canal for the stapes was entirely open, and that there was a notch in the tympanic ring; the latter being partly formed by the quadratojugal. *Purchased*, 1872.

**R. 1503.** Cast of a smaller cranium. The original was obtained from the Cambridge Greensand, and is preserved in the Collection of T. Jesson, Esq., of Northampton; it is noticed by the writer, *loc. cit.* The wide nasals are well shown. *Made in the Museum*, 1889.

### **Rhinochelys macrorhina,** Lydekker[1].

Skull more vaulted than in the type species, with a much flattened frontal region, the premaxillæ rather less prominent and somewhat deeper, and the nasals very much larger and longer; nares of medium size.

*Hab.* Europe (England).

**35193.** (*Fig.*) The anterior portion of the cranium, with the palate obscured by phosphate; from the Cambridge Greensand. The type; figured by the writer in the 'Quart. Journ. Geol. Soc.' vol. xlv. pl. viii. figs. 7, 7 *a*. All the bones posterior to the frontals are wanting, but the others are nearly perfect. *Purchased*, 1859.

**R. 1504.** Cast of the corresponding portion of a rather smaller cranium. The original was obtained from the Cambridge Greensand, and is in the collection of T. Jesson, Esq., of Northampton. *Made in the Museum*, 1889.

[1] Quart. Journ. Geol. Soc. vol. xlv. p. 230 (1889).

**35196.** The corresponding portion of a still smaller cranium ; from the Cambridge Greensand. The oral surface of the palate is well preserved. *Purchased*, 1859.

**R. 1558.** The anterior part of a cranium, agreeing closely with the preceding specimen ; from the Cambridge Greensand. *Presented by Prof. T. Rupert Jones*, 1889.

### **Rhinochelys elegans,** Lydekker[1].

Allied to the preceding, but with the nasals relatively wider and shorter, and the premaxillæ considerably deeper. The latter character causes the beak to have a decidedly hooked appearance. There is also a peculiar lateral swelling of the prefrontal region, which appears to be wanting in *R. macrorhina*.

It does not appear that the characters of the present form are due to the abrasion of the alveolar walls in the last-named species. In the present form the vertical diameter of the nasals considerably exceeds that of the nares, whereas in *R. macrorhina* the former dimension is slightly the smaller of the two.

The largest specimens in the Collection are referred to this form.

*Hab.* Europe (England).

**41796.** (*Fig.*) The cranium, wanting the parietal and occipital region, and with the palate obscured by phosphate ; from the Cambridge Greensand. The type ; figured by the writer in the ' Quart. Journ. Geol. Soc.' vol. xlv. pl. viii. figs. 5, 5*a*. *Purchased*, 1869.

**35194.** The anterior portion of a somewhat larger cranium ; from the Cambridge Greensand. The characteristic depth of the premaxillæ is well shown. *Purchased*, 1859.

**35195.** The anterior extremity of a similar cranium ; from the Cambridge Greensand. *Purchased*, 1859.

**R. 1496.** Cast of a nearly entire cranium, probably belonging to a large individual of this species. The original was obtained from the Cambridge Greensand, and is in the collection of T. Jesson, Esq., of Northampton ; it is figured by the writer, *op. cit.* pl. viii. fig. 4. This skull is remarkable for the absence of any trace of a suture between the nasals and prefrontals, which at first sight suggests that it belongs to *Chelone*. The peculiar form of the suture between the frontals and prefrontals shows, however,

[1] Quart. Journ. Geol. Soc. vol. xlv. p. 230 (1889).

where the nasal suture should be; while we have the continuation of the alveolar line of the maxilla by the jugal, which is at once distinctive. There is a peculiar swelling of the prefrontals on the border of the orbit which seems to be characteristic of the present species.

*Made in the Museum*, 1889.

**46371.** A smaller but nearly entire cranium, apparently specifically identical with the preceding specimen; from the Cambridge Greensand. The characteristic lateral expansion of the prefrontals is well shown. The sutures on the frontal aspect are very indistinct, and the palate is obscured by phosphate. The articular surfaces of the quadrates are exposed, and have the non-pedunculated character found in recent Pleurodirans; the exact contour of these surfaces is, however, not clearly seen.

*Cunnington Collection. Purchased*, 1875.

**46371 a.** A somewhat smaller cranium of similar type; from the Cambridge Greensand. The surface of the fronto-nasal region is chipped away, and the squamosal is wanting.

*Cunnington Collection.*

**35197.** A still smaller cranium of the same type; from the Cambridge Greensand. The occiput and palate are coated with phosphate; the other surfaces are nearly perfect, although the sutures are indistinct. *Purchased*, 1859.

**R. 27.** An imperfect and shattered cranium, probably belonging either to the present or a closely-allied species; from the Gault of Folkestone, Kent.

*Gardner Collection. Purchased*, 1879.

### **Rhinochelys brachyrhina,** Lydekker[1].

This species is characterized by the extremely small size of the nasals, in which the width exceeds the length, and by the very large dimensions of the nares, as well as by the circumstance that the prefrontals enter largely into the formation of the nares. This form should perhaps represent a distinct genus.

*Hab.* Europe (England).

**R. 1504.** Cast of the anterior portion of the cranium. The original, which is the type, was obtained from the Cambridge Greensand, and is preserved in the collection of T. Jesson,

[1] Quart. Journ. Geol. Soc. vol. xlv. p. 231 (1889).

Esq., of Northampton; it is figured by the writer in the 'Quart. Journ. Geol. Soc.' vol. xlv. pl. viii. figs. 3, 3 *a*. The oral ridges on the palate are well shown.

*Made in the Museum*, 1889

### **Rhinochelys jessoni,** Lydekker[1].

Skull much depressed, and the beak markedly hooked; narial aperture small, with the nasals antero-posteriorly elongated and narrowing superiorly; prefrontals very large, almost meeting in the middle line above the nares, and entering to a small extent into the formation of the nares; frontals very short and wide; parietals much wider than in the other species.

This species should perhaps form the type of a distinct genus.

*Hab.* Europe (England).

**R. 1506.** Cast of the slightly imperfect cranium. The original, which is the type, was obtained from the Cambridge Greensand, and is preserved in the collection of T. Jesson, Esq., of Northampton; it is figured by the writer in the 'Quart. Journ. Geol. Soc.' vol. xlv. pl. viii. figs. 6, 6 *a*, 6 *b*. The extremity of the premaxillæ is broken off. This specimen differs from the skulls of the other species by the strongly marked impressions of the epidermal shields in the fronto-nasal region, which are liable to be mistaken for sutures. The indistinctness of many of the sutures apparently shows that this specimen belongs to an adult individual, and consequently that the species was of smaller size than either of the preceding. The specimen is important as showing that the squamosal, if not actually articulating with the parietal, was at all events closely approximated to that bone. The conformation of the anterior border of the tympanic ring is very clearly displayed.

*Made in the Museum*, 1889.

### **Rhinochelys,** sp.

The undermentioned specimen indicates a larger form apparently allied to the preceding species, but with the premaxillæ more prominent, the nasals square, and the prefrontals consequently widely separated from one another.

*Hab.* Europe (England).

**R. 1509.** Cast of the anterior portion of the cranium. The original

[1] Quart. Journ. Geol. Soc. vol. xlv. p. 231 (1889).

was obtained from the Cambridge Greensand, and is preserved in the collection of T. Jesson, Esq., of Northampton. The extremity of the beak is well preserved, and the contour of the nasals, prefrontals, and frontals is shown. The palate is obscured by matrix.

*Made in the Museum*, 1889.

*Specifically Undetermined Mandibles, of which at least the majority are referable to this genus.*

**49919.** Fragment of chalk exhibiting the ventral surface of the symphysis and part of the right ramus of a comparatively large mandible; from the Lower Chalk near Lewes, Sussex. *Capron Collection. Purchased*, 1879.

**49920.** Fragment of chalk showing a somewhat smaller imperfect mandibular symphysis; from near Lewes. The extremity of the median oral ridge is shown.

*Capron Collection.*

**47221.** Two specimens of mandibular symphyses, with the oral surface embedded in matrix; from the Chalk Marl of Dover, Kent. *Gardner Collection. Purchased*, 1876.

**R. 793.** The anterior extremity of a mandible; from the Lower Chalk of Dover. *Purchased*, 1886.

**R. 401.** Fragment of rock, exhibiting the anterior extremity of a large mandible, probably belonging to this genus; from the Lower Chalk near Weymouth, Dorsetshire. This specimen would agree in relative size with the cranium No. R. 1496 of *R. elegans*.

*Presented by C. Westendarp, Esq.*, 1884.

**R. 402.** Fragment of rock containing the proximal extremity of a right humerus, apparently associated with the preceding specimen; from the same locality. The humerus accords generally with that of *Chelys*, both in size and contour, and also closely resembles the somewhat smaller humerus of *Parachelys* (*infrà*, p. 195).

*Presented by C. Westendarp, Esq.*, 1884.

**35185.** The imperfect symphysis of a comparatively large mandible, with the oral surface obscured by phosphate; from the Cambridge Greensand. *Purchased*, 1859.

**35191.** The symphysis and part of the left ramus of a mandible

agreeing in size with the preceding specimen, but relatively narrower; from the Cambridge Greensand.
*Purchased*, 1859.

**46373.** The imperfect symphysis of a more flattened mandible; from the Cambridge Greensand. The oral ridge is exhibited.
*Cunnington Collection. Purchased*, 1875.

**35183.** The imperfect symphysis of a very similar mandible; from the Cambridge Greensand. The oral ridge is extremely prominent. *Purchased*, 1859.

**35184.** The symphysis of a mandible, with the oral surface obscured by phosphate; from the Cambridge Greensand.
*Purchased*, 1859.

**35185 a.** The symphysis of a mandible; from the Cambridge Greensand. The oral ridge is indistinct. *Purchased*, 1859.

**46374.** The symphysis of a mandible; from the Cambridge Greensand. The oral surface, which is to a great extent obscured by matrix, is characterized by its deep channelling.
*Cunnington Collection.*

**30257.** The symphysis of a mandible; from the Cambridge Greensand. This specimen is of a flattened type.
*Purchased*, 1855.

**30257 a.** The symphysis of a mandible with the oral surface covered with phosphate; from the Cambridge Greensand. This specimen is of the deep type of No. 35191.
*Purchased*, 1855.

**47210.** The anterior extremity of a mandible, in matrix; from the Gault of Folkestone, Kent. The ventral surface is exhibited. *Gardner Collection. Purchased*, 1876.

(*Trachydermochelys phlyctænus*, Seeley [1].)

The following fragments of shell belong to the Chelonian to which the above name has been applied. The carapace is characterized by the pustular sculpture of the outer surface, and by the expansion of its posterior border. There is at present no evidence to show why this type of shell should not be referred to *Rhinochelys* [2].

[1] Index to Aves &c. in Cambridge Museum, pp. xix, 33 (1869).
[2] See Quart. Journ. Geol. Soc. vol. xlv. p. 229.

**46375.** An imperfect posterior marginal; from the Cambridge Greensand. The sulcus between two marginal shields is distinctly visible.

*Cunnington Collection.* *Purchased*, 1875.

**35188.** A smaller free marginal; from the Cambridge Greensand.

*Purchased*, 1859.

**35188 a.** Fragment of a posterior marginal, not improbably associated with the preceding; from the Cambridge Greensand. *Purchased*, 1859.

**35188 b.** An imperfect costal; from the Cambridge Greensand. This specimen may have been associated with the last.

*Purchased*, 1859.

**43981.** Fragment of a costal; from the Cambridge Greensand. In this specimen the pustulation is much finer than in the preceding; a difference which is probably specific.

*Purchased*, 1872.

## Family PLESIOCHELYIDÆ[1].

Shell usually thick, without mesoplastrals, and with either a reduced or the full number of neurals and suprapygals; only the pubis uniting with the xiphiplastral. Entoplastral small. Inframarginal shields at least usually present. Skull (when known) with roofed temporal fossæ; other characters not definitely known. Phalangeals of manus, when known (*Idiochelys* and *Parachelys*), reduced in number. There may be a plastral vacuity.

The skull is definitely known in *Idiochelys*. In a skull from the Kimeridgian of Hanover, figured by Portis in the 'Palæontographica,' vol xxv. art. 3, pl. xvii. figs. 12, 13, and said to have been associated with the carapace and plastron of the so-called *Chelonides wittei* (*vide infrà*, p. 197), the temporal fossæ are roofed, and the palatines are described as meeting in the middle line. The skull which Rütimeyer suggests may be referable to *Plesiochelys* is noticed below (p. 204); its temporal fossæ are roofed over, the palatines are in contact, there are said to be no distinct nasals, and the pterygoids are of a Cryptodiran type.

[1] Usually given as *Plesiochelydidæ*.

## Genus **IDIOCHELYS**, Meyer[1].

Syn. *Chelonemys*, Jourdan[2].

Shell with deeply emarginate nuchal; neurals frequently short and interrupted, never exceeding seven in number, and not connected with the one suprapygal; entoplastral narrow and diamond-shaped; hypoplastrals short. Vertebral shields very broad, with the underlying areas smooth; inframarginal shields (if present) broad, and extending on to the marginal bones; sulcus dividing abdominal and plastral shields extending nearly straight across the plastron, and joining the inframarginal (? marginal) sulcus. Number of phalangeals in manus 2, 2, 3, 3, 3. Ossification of carapace apparently not completed till late in life.

This genus was provisionally referred by Rütimeyer[3] to the Pleurodira, by whom it was pointed out that the cervical vertebræ have distinct transverse processes. This reference is strongly confirmed by the resemblance of the shell to that of the next genus; and likewise by the number of phalangeals in the digits of the manus being the same as in *Parachelys* (*infrà*). Further, the evidence derived from the flexure of the neck in the undermentioned specimens is also confirmatory of this view. Rütimeyer states that while the skull shows some resemblance to that of *Acichelys*, it approximates in contour to that of *Podocnemis*.

### **Idiochelys fitzingeri**, Meyer[4].

Syn. *Idiochelys wagnerorum*, Meyer[5].
*Idiochelys wagneri*, Meyer[6].
*Chelonemys plana*, Jourdan[7].
*Chelonemys ovata*, Jourdan[8].

The type and only described species, the whole of the forms to which the above-mentioned names have been applied being considered by Rütimeyer as specifically identical. All the figured specimens indicate immature individuals, and are of relatively small size. The number of neural bones is subject to considerable variation in the posterior half of the carapace, the specimen figured in

[1] Neues Jahrb. 1839, p. 77.
[2] Extr. Procès-Verb. Soc. Agric. Lyon, sér. 3, vol. vi. p. xxxiii (1862).
[3] N. Denkschr. schw. Ges. Nat. vol. xxv. art. 2, p. 140 (1873).
[4] Neues Jahrb. 1839, p. 77.
[5] In Bronn's Index Palæontologicus, p. 606 (1848).
[6] *Ibid.* The authority for this name is given by Bronn as Münster's 'Beiträge z. Petrefactenkunde,' but in the 2nd ed. of that work the name is given as *I. fitzingeri*.
[7] *Loc. cit.*
[8] *Loc. cit.* p. xxxiii.

Meyer's 'Rept. Lith. Schiefer,' pl. xviii. fig. 1, showing no neurals posteriorly to the third costals.

*Hab.* Europe (Bavaria and France).

**40346.** Cast of a slab showing the dorsal aspect of the imperfect skeleton of an immature individual. The original was obtained from the Lower Kimeridgian Lithographic Stone of Cirin (Ain), and is preserved in the Museum at Lyons; it is the type of *Chelonemys ovata*, and is figured by Rütimeyer in the 'N. Denkschr. schw. Ges. Nat.' vol. xxv. art. 2, pl. xv. fig. A. There appear to have been seven neurals. The great width of the skull, as compared with that of the next example, appears to be due to crushing. The lateral flexure of the neck in this and the other two specimens figured in the same plate is strongly in favour of Pleurodiran affinities. *Purchased*, 1867.

**40345.** Cast of a slab exhibiting the ventral aspect of an apparently similar skeleton. The original, which was obtained from the Lithographic Stone of Cirin, and is preserved in the Museum of Lyons, is the type of *Chelonemys plana*. It is figured by Rütimeyer, *op. cit.* pl. xv. fig. B.

*Purchased*, 1867.

## Genus **HYLÆOCHELYS**, Lydekker[1].

Syn. (?) *Plastremys*, Owen[2].

Shell with distinctly emarginate nuchal; neurals long and narrow, usually only seven in number, with the 8th costals meeting in the middle line; entoplastral narrow and diamond-shaped; hypoplastrals short. Vertebral shields very broad, with the underlying areas either smooth or slightly fluted; inframarginals broad and extending on to the marginal bones; sulcus between abdominal and femoral shields as in *Plesiochelys*.

The dorsal ribs are usually strongly developed, the rib underlying the first costal being, as in *Idiochelys*, very prominent. The width of the vertebral shields of the carapace always exceeds twice their length, and may be more than three times the length. The shell is of moderate thickness, and may have a persistent plastral vacuity.

[1] Quart. Journ. Geol. Soc. vol. xlv. p. 513 (1889).
[2] *Ibid.* vol. xxxvii. p. 370 (1881).

It cannot be proved that this genus (which is therefore provisional) is really distinct from *Hydropelta*, Meyer[1], of the Kimeridgian Lithographic limestone; or from *Chitracephalus*, Dollo[2], from the Wealden of Belgium. The latter genus is founded on immature Chelonians, in which the skull is much elongated and has open temporal fossæ. The difference of this type of skull from that of *Idiochelys* is, so far as it goes, in favour of the distinctness of *Hylæochelys* from *Chitracephalus*. The genus *Chelonides*, to which the present appears allied, is noticed under *Plesiochelys*. The generic term *Plastremys* was never sufficiently defined, and is practically a MS. name.

### **Hylæochelys latiscutata** (Owen[3]).

Syn. *Pleurosternum latiscutatum*, Owen[4].
*Platemys latiscutata*, Maack[5].
(?) *Pleurosternum koeneni*, Grabbe[6].

The type species. Of comparatively small size, with the plastral vacuity nearly obliterated. Neural bones very long, and in the undermentioned specimens, at least, seven in number; 3rd costals frequently meeting in the middle line behind the 3rd neural. Nuchal relatively short and wide, with moderate emargination.

The type specimen is a carapace from the Purbeck, and is figured by Owen in his 'Wealden and Purbeck Reptilia' (Mon. Pal. Soc.), pt. i. pl. i. In that specimen the 3rd neural bone is in contact with the 4th, and an 8th neural is represented as connecting the 7th with a suprapygal. The same features are shown in the restoration of *Pleurosternum koeneni* given by Grabbe in the 'Zeitschr. deutsch. geol. Ges.' vol. xxxvi. p. 20; but from the figure of the original specimen given in pl. i. of the same volume, it is quite evident that the 8th costals met in the middle line, and the same may have been the case with the type specimen. *P. koeneni* is from the German Wealden, and, so far as can be determined from the ventral surface of the carapace, belongs to the present form.

*Hab.* Europe (England and [?] Germany).

[1] Fauna der Vorwelt—Rept. Lith. Schiefer, p. 139 (1860).
[2] Bull. Mus. R. Hist. Nat. Belg. vol. iii. p. 70 (1884).
[3] Wealden and Purbeck Reptilia (Mon. Pal. Soc.), pt. i. p. 9 (1853).—*Pleurosternum*.
[4] *Loc. cit.*
[5] Palæontographica, vol. xviii. p. 295 (1869).
[6] Zeitschr. deutsch. geol. Ges. vol. xxxvi. p. 19 (1884).

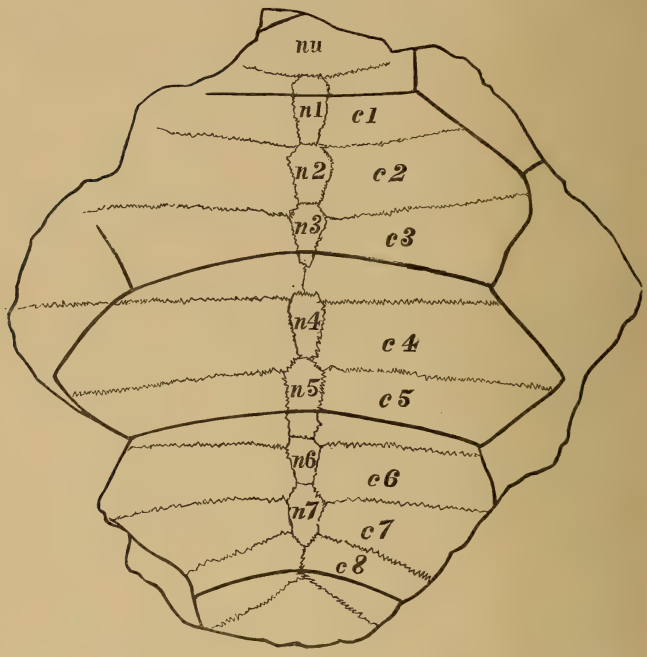
**R. 1640.** Slab showing the dorsal aspect of an immature carapace, wanting the nuchal and all the marginals with the exception of two at the posterior extremity; from the Purbeck of Swanage, Dorsetshire. This specimen agrees with the type carapace figured by Owen in his 'Wealden and Purbeck Reptilia,' pt. i. pl. i., in that the 3rd neural has a narrow junction with the 4th; but the 8th costals meet in the median line behind the 7th neural. The vertebral shields are moreover somewhat wider, their lateral borders having been situated on the vacuities between the costal and marginal bones. This excessive width of the vertebral shields at once serves to distinguish this carapace from *Acichelys*, in which at a similar stage of development these shields had their lateral borders placed at some distance within the border of the ossified costals. *Purchased*, 1889.

**24299.** Slab showing the ventral surface of an immature carapace, imperfect anteriorly, and wanting all the marginals; from the Purbeck of Swanage. This specimen closely resembles the last. The neurals, with the exception of part of the 1st, are distinctly shown, and are seven in number; the 3rd costals meet in the middle line behind the 3rd neural, and the 8th costals behind the 7th neural. The imperfect 1st costal seems to have had the outer extremity of its rib nearly as strongly developed as in the undermentioned *H. belli*. *Cunnington Collection. Purchased*, 1849.

**23624.** (*Fig.*) An imperfect shell; from the Wealden of Burwash, Sussex. Noticed by G. A. Boulenger and the present writer in the 'Geol. Mag.' dec. iii. vol. iv. p. 272, where it is provisionally referred to *Plesiochelys*. In its long neural bones and extremely wide vertebral shields the carapace (fig. 43) agrees closely with the type; but the shields are even relatively still wider. The meeting of the 3rd and the 8th costals is distinctly seen. The nuchal is imperfect, but its shape accords with that of the type. The stoutness of the extremity of the rib supporting the first costal (as seen in section on the right side of the specimen) is similar to that of *H. belli*. The plastron is well preserved, although imperfect anteriorly. The narrow diamond-shaped entoplastral resembles that of *Idiochelys*. The absence of the mesoplastral (which at once serves to

distinguish this species from *Pleurosternum*) is well shown. The hypoplastral is relatively short, with the sulcus dividing the abdominal from the femoral shield ascending towards the middle line, and terminating in the inguinal notch. The plastral vacuity is nearly obliterated. The

Fig. 43.




*Hylæochelys latiscutata.*—The imperfect carapace; from the Wealden of Sussex. ¼. *nu*, nuchal bone; *n* 1–*n* 7, neural bones; *c* 1–*c* 8, costal bones.

area occupied by the intergular shield is not shown. The pelvic bones and femora are preserved, although dislocated. The removal of part of the right xiphiplastral shows a prominence on the border of the portion still remaining in position, which appears to have been the attachment of the pelvis.

*Presented by the Rev. J. Gould*, 1849.

### Hylæochelys emarginata (Owen [1]).

Syn. *Pleurosternum emarginatum*, Owen [2] (*in parte*).
*Platemys emarginata*, Maack [3].

Imperfectly known, but attaining considerably larger dimensions than the type species. Nuchal larger, narrower, and more deeply emarginate than in the latter. Plastron probably with a very large vacuity, which extends into the hyoplastral.

This species was founded on a carapace from the Purbeck, of which the exposed ventral aspect is figured by Owen in his 'Wealden and Purbeck Reptilia,' pt. i. pl. iv. [4] From the deeply emarginate nuchal and the strongly developed ribs there is no reasonable doubt that the species should be referred to the present genus. If the undermentioned plastron be rightly referred, this form will certainly be specifically distinct from *H. belli*.

*Hab.* Europe.

**R. 1522.** Slab showing the ventral aspect of the nuchal bone; from the Purbeck of Swanage, Dorsetshire. This specimen agrees with the corresponding bone of the type carapace, exhibiting the same deep emargination, and the groove on the ventral aspect of the anterior border. *No history.*

**45937.** Slab exhibiting portions of a shell which from its large size is probably referable to the present form; from the Purbeck of Swanage. This specimen shows the left half of the greater part of the plastron, from the ventral aspect; the dorsal aspect of the 3rd left costal, and the ventral aspect of the 6th costal of the same; together with several marginals. The 3rd costal shows part of the sulcus of the 2nd vertebral shield; which is thus seen to have had the characteristic wide shape. The plastron agrees in general characters with the specimens mentioned under the head of *H. belli*, but the vacuity extends into the hyoplastral. The marginals agree closely with the posterior ones of that species. *Presented by J. C. Robinson, Esq.*, 1874.

[1] Wealden and Purbeck Reptilia (Mon. Pal. Soc.), pt. i. p. 6 (1853).—*Pleurosternum.* [2] *Loc. cit.*

[3] Palæontographica, vol. xviii. p. 293 (1869).

[4] The other specimens figured under the same name are referable to the *Pleurosternidæ*.

*The following specimens probably belong to this species.*

**40654.** Fragment of rock exhibiting the dorsal aspect of the fourth neural bone; from the Purbeck of Swanage. In its elongated and narrow form this bone resembles the neurals of the type of *H. latiscutata*, but is of larger size.
*Purchased*, 1867.

**28620.** Slab exhibiting the ventral aspect of the 4th (?) costal of the left side; from the Purbeck of Swanage. This specimen agrees very closely with the corresponding costal of the type. *Purchased*, 1853.

**44817.** Slab exhibiting the dorsal aspect of an immature fourth costal of the left side; from the Purbeck of Swanage. The great width of the vertebral shield is shown by the position of its lateral sulcus.
*Presented by Benjamin Bright, Esq.*, 1873.

### **Hylæochelys belli** (Mantell [1]).

Syn. *Chelone belli*, Mantell [2].
*Chelone mantelli*, Fitzinger [3].
*Chelone costata*, Owen [4].
(?) *Emys mantelli*, Gray [5].
*Platemys mantelli*, Owen [6].
*Platemys dixoni*, Owen [7].

Known only by fragments of the shell and limb-bones. Of large size, with the outer extremity of the rib supporting the first costal bone very large and prominent; the plastron with a large persistent vacuity, which does not, however, impinge on to the hyoplastral.

The identity of *Chelone costata* with *C. belli* was clearly pointed out by Mantell; and there would seem to be no reasonable doubt but that the fragments of plastron which were made the types of *Platemys mantelli* and *P. dixoni* are referable to the same form.

Some of the specimens included under this heading may be referable to the preceding forms.

*Hab.* Europe (England).

**36529.** (*Fig.*) The distal extremity of the second left costal of an immature individual; from the Wealden of Cuckfield, Sussex. The

[1] Medals of Creation, 1st ed. p. 776 (1844).—*Chelonia.* [2] *Loc. cit.*
[3] Ann. Mus. Wien, vol. i. p. 128 (1835).
[4] Wealden and Purbeck Reptilia (Mon. Pal. Soc.), pt. i. p. 10 (1853).
[5] Synopsis Reptilium, p. 33 (1831).—No description.
[6] *Op. cit.* p. 11. [7] *Ibid.* p. 12.

type specimen. Figured by Mantell in his 'Fossils of Tilgate Fossil,' pl. vi. fig. 2 (without name); also in his 'Medals of Creation,' 1st ed. p. 776, and 2nd ed. p. 735, fig. 240, and in his 'Petrifactions and their Teachings,' p. 156, fig. 33. These woodcuts are reversed and turned the wrong way upwards. The extremity of the sulcus of the first vertebral shield is shown, and also that dividing the first and second costal shields. The contour of these sulci agrees closely with the same part in the type species, and shows that the vertebral shields were of similar proportions. *Mantell Collection. Purchased*, 1853.

**2370.** (*Fig.*) Slab of sandstone showing the ventral surface of the anterior portion of the left side of the carapace; from the Wealden of Cuckfield. Figured by Owen in his 'Wealden and Purbeck Reptilia,' pt. i. pl. viii. fig. 1, as *Chelone costata*, of which it is the type. The specimen shows the first and second marginals, the lateral extremity of the nuchal, and the greater portion of the first and second costals. Allowing for the difference in the age of the individuals to which the two specimens belonged, the extremity of the second costal accords well with the type.
*Mantell Collection. Purchased*, 1838.

**2281.** Slab of sandstone exhibiting the ventral aspect of the nuchal and of a costal bone; from Cuckfield. The extremity of the nuchal agrees precisely with the fragment in No. 2370, and the contour of the entire bone is very similar to that of the type species. *Mantell Collection.*

**2306.** Fragment of sandstone exhibiting the ventral aspect of the distal portion of the first left costal of a large individual; from Cuckfield. The extremity of the rib is wanting, but the portion remaining agrees with the corresponding bone of No. 2370. *Mantell Collection.*

**2276.** The imperfect distal portion of the first left costal; from Cuckfield. This specimen agrees precisely with the corresponding bone of *H. latiscutata*, showing part of the antero-lateral border of the second vertebral shield. The same thickening of the rib is shown on the right of the shell No. 23264 of *H. latiscutata*, and also in *Idiochelys*.
*Mantell Collection.*

**3505.** Part of the first costal of the right side; from Cuckfield.
*Mantell Collection.*

**2266.** Slab exhibiting the dorsal surface of the second left costal; from Cuckfield. The extreme width of the vertebral and the narrowness of the costal shields is well displayed. *Mantell Collection.*

**2347.** Fragment of rock showing the ventral surface of the outer part of an immature costal; from Cuckfield. *Mantell Collection.*

**36529.** The proximal portion of a left costal, probably the third; from Cuckfield. The sulcus dividing two vertebral shields is well shown. *Mantell Collection. Purchased*, 1853.

**36529 a.** An imperfect left (?) costal, apparently associated with the preceding; from Cuckfield. This bone is probably either the second or the fourth. *Mantell Collection.*

**3523.** The imperfect proximal portion of the third right costal; from Cuckfield. This specimen agrees very closely with the corresponding costal of *H. latiscutata*, the great width of the vertebral shield being clearly indicated. *Mantell Collection. Purchased*, 1838.

**26022.** The third marginal of the right side; from Cuckfield. The cavity for the insertion of the axillary pedicle is well shown. *Mantell Collection. Purchased*, 1853.

**3501.** A smaller specimen of the third right marginal; from Cuckfield. *Mantell Collection. Purchased*, 1838.

**R. 1519.** A similar specimen; from Cuckfield. *Mantell Collection.*

**3504.** An imperfect third right marginal; from Cuckfield. *Mantell Collection.*

**R. 1520.** The third left marginal; from Cuckfield. This specimen agrees in size with No. 26022. *Mantell Collection.*

**R. 250.** The imperfect third left marginal; probably from Cuckfield. *Egerton Collection. Purchased*, 1882.

**3503.** A lateral marginal of an immature individual; from Cuckfield. The pit for the insertion of the extremity of the rib is well shown. In its narrow form, as compared with the anterior and posterior marginals, this specimen accords with the lateral marginals of the immature skeletons of *Idiochelys*. *Mantell Collection. Purchased*, 1838.

**3500.** A lateral marginal; from Cuckfield. *Mantell Collection.*

**3552.** A lateral marginal; from Cuckfield. *Mantell Collection.*

**2274.** The seventh marginal of the right side; from Cuckfield.
(*Fig.*) Figured by Mantell in his 'Fossils of Tilgate Forest,' pl. vi. fig. 7. This specimen shows the pit for the insertion of the inguinal pedicle. In its everted border it resembles *Podocnemis*. *Mantell Collection.*

**R. 1521.** Another specimen of the seventh marginal of the right side; from Cuckfield. *Mantell Collection.*

**2271.** A flattened and imperfect specimen of the homologous bone; from Cuckfield. *Mantell Collection.*

**6002.** A posterior marginal; from Cuckfield. *Mantell Collection.*

**10823.** Another specimen of a marginal serially homologous with the last; from Cuckfield. *Mantell Collection.*

**2271.** An imperfect posterior marginal; from Cuckfield. *Mantell Collection.*

**2289.** Slab of sandstone showing portions of two costals of a large
(*Fig.*) individual, together with the imperfect right humerus; from Cuckfield. The humerus, of which the distal extremity is wanting, is figured by Owen, *op. cit.* pl. viii. fig. 3, as an ilium. The ventral surface of this bone is exposed; and the matrix preserves the impression of the dorsal side of the missing distal portion, in which a cast of the ectepicondylar groove is distinctly seen. This humerus resembles that of *Chelys* (fig. 1, B) and *Parachelys* (*infrà*), and is totally different from the type of humerus referred to the *Acichelyidæ* (fig. 1, A). The femur figured by Owen, *op. cit.* pl. viii. fig. 2, as that of the present form, is from the London Clay (*suprà*, p. 63, No. 1603). *Mantell Collection.*

**2268.** The imperfect left hyoplastral; from Cuckfield. The type of
(*Fig.*) *Platemys dixoni*; figured by Owen, *op. cit.* pl. ix. fig. 3, the figure being drawn the wrong way upwards. This specimen agrees in all characters with the next. *Mantell Collection.*

**2313.** Slab showing the ventral aspect of a less imperfect hyoplastral; from Cuckfield. This specimen, although broken into several fragments, shows the contour of the whole

bone with the exception of a portion at the postero-internal angle. Allowing for its larger size this specimen agrees in all characters with the hyoplastral of *H. latiscutata*, showing the narrowness of the incision for the entoplastral. It is readily distinguished from *Plesiochelys* by the wider inframarginal shields, of which the outer border was placed on the marginal bones. *Mantell Collection.*

**2299.** Slab showing the dorsal aspect of an apparently similar right hyoplastral; from Cuckfield. The narrowness of the notch for the entoplastral is well shown. *Mantell Collection.*

**39457.** Slab exhibiting the ventral aspect of the left side of a plastron, of which the hyoplastral agrees very closely with No. 2313; from the Purbeck of Swanage, Dorsetshire. The ento- and epiplastrals are wanting, and the xiphiplastral is imperfect. The entoplastral agrees generally with that of *H. latiscutata*, but is still shorter; the sulcus dividing the abdominal and femoral shields extends obliquely upwards from the middle of the inguinal notch to the large heart-shaped mesial vacuity. This specimen, if not specifically identical with the Wealden examples, indicates a closely allied form.

*Bowerbank Collection. Purchased*, 1865.

**2261.** Slab exhibiting the ventral aspect of an imperfect right hypoplastral agreeing very closely with the corresponding bone of the preceding specimen; from the Wealden of Cuckfield.

*Mantell Collection.*

**2288.** (*Fig.*) Slab exhibiting the dorsal aspect of a similar hypoplastral of the right side; from Cuckfield. Figured by Owen, *op. cit.* pl. ix. fig. 1, in a reversed position as a hyoplastral, under the name of *Platemys mantelli*, of which it is the type. *Mantell Collection.*

**2296.** Slab exhibiting several imperfect marginals which not improbably belong to this form; from Cuckfield.

*Mantell Collection.*

**3541.** An imperfect right humerus, agreeing closely with the corresponding bone of No. 2289; from Cuckfield. The proximal portion of this specimen is wanting, but the remaining part resembles the humerus of *Chelys*.

*Mantell Collection.*

### **Hylæochelys (?) lata** (Owen[1]).

Syn. *Plastremys lata*, Owen[2].

Very imperfectly known and at present not admitting of exact definition; anal shield of plastron confined to xiphiplastral.

*Hab.* Europe (England).

**R. 48.** The imperfect shell; from the Upper Greensand of the Isle of Wight. Noticed by Owen, in the 'Quart. Journ. Geol. Soc.' vol. xxxvii. p. 370, as *Plastremys*, of which it is the type, but without sufficient description. The greater part of the right side of the plastron and the dorsal aspect of two costals are seen. The latter show that the vertebral shields were of the extreme width characteristic of this genus; the wide inframarginals are also shown, while the absence of a mesoplastral is likewise indicated.

*Purchased*, 1880.

## Genus **PARACHELYS**, Meyer[3].

Imperfectly known, but probably identical with *Plesiochelys*, in which case the present name should stand, and the family name *Parachelyidæ* replace that of *Plesiochelyidæ*. Number of phalangeals of manus as in *Idiochelys*.

It was pointed out by Rütimeyer[4] that the manus of this genus resembles that of *Idiochelys*. Zittel[5] identified *Parachelys* with *Eurysternum*, considering the number of phalangeals abnormally reduced.

### **Parachelys eichstædtensis**, Meyer[6].

Syn. *Parachelys eichstättensis*, Meyer[7].

The type species.

*Hab.* Europe (Bavaria).

The following specimens are the types, and were obtained from the Lower Kimeridgian lithographic limestones of Eichstädt, Bavaria. They form a part of the Van Breda Collection. *Purchased*, 1871.

**42888.** Slab showing fragments of the carapace and plastron. (*Fig.*) Figured by Meyer in the 'Palæontographica,' vol. xi. pl. xlv. fig. 1. The portion of the carapace is seen from the dorsal aspect, and comprises part of the left side of the anterior extremity, showing part of the nuchal, the

[1] Quart. Journ. Geol. Soc. vol. xxxvii. p. 370 (1881).—*Plastremys.*
[2] *Loc. cit.* [3] Palæontographica, vol. xi. art. 6, p. 289 (1864).
[4] N. Denkschr. schw. Ges. Nat. vol. xxv. art. 2, p. 140.
[5] Palæontographica, vol. xxv. p. 182. [6] *Loc. cit.* [7] *Loc. cit.*

1st and 2nd marginals, and portions of the 1st and 2nd costals. The figure is totally incorrect in regard to the boundaries of the bones and horny shields. The area occupied by the first vertebral shield is very similar in contour to that obtaining in *Plesiochelys*, its lateral boundary joining the sulcus between the 1st and 2nd marginal shields. (In *Idiochelys* this boundary joins the sulcus between the 2nd and 3rd marginal shields.) The nuchal shield consists of a median and two lateral portions, as in the carapace of *Plesiochelys* figured by Rütimeyer, *op. cit.* pl. vi. The crenulated anterior boundary of the 2nd vertebral shield is seen on the inner side of the specimen. The fragments of the plastron show no distinctive features.

**42888 a.** (*Fig.*) Part of the same slab, showing the right scapulo-precoracoid and humerus. Figured by Meyer, *op. cit.* figs. 2–4. The humerus closely resembles that of *Chelys*, and differs entirely from the specimens referred to the *Acichelyidæ* (p. 157).

**42888 b.** (*Fig.*) The associated right coracoid. Figured by Meyer, *op. cit.* fig. 5.

**42888 c.** (*Fig.*) Part of the same slab, showing the dorsal aspect of the right manus. Figured by Meyer, *op. cit.* fig. 6. The metacarpals and phalangeals are beautifully shown. In the reduction of the number of phalangeals of the second digit this specimen indicates a step towards the existing *Pelomedusa*, in which alone among aquatic forms the number of phalangeals in all the digits of the manus is 2; the number in the pes being 2, 2, 3, 3, 3, or the same as in the present specimen.

**42888 d.** Part of the same slab, showing the distal extremity of the left humerus, part of the manus of the same side, the centra of four cervical vertebræ, and fragments of the shell. Two of the vertebræ clearly show the bases of transverse processes, while in the others, which were probably later in the series, these appear to be wanting.

## Genus **PLESIOCHELYS**, Rütimeyer[1].

Syn. *Stylemys*, Maack[2] (*in parte*).

Shell with the nuchal more or less emarginate; neurals generally

[1] N. Denkschr. schw. Ges. Nat. vol. xxv. art. 2, p. 28 (1873).

[2] Palæontographica, vol. xviii. p. 320 (1869). Preoccupied by Leidy, 1851, *vide suprà*, p. 93.

long and narrow, 8 in number, and connected with the first of the three suprapygals; entoplastral wide and generally rounded posteriorly; hypoplastrals relatively long. Vertebral shields of medium width, usually with the underlying areas fluted; intergular divided; inframarginals narrow and, as a rule, not extending on to the marginal bones; sulcus between abdominal and femoral shields ascending towards the hyoplastral suture, and terminating in the middle of the inguinal notch. The width of the vertebral shields is usually equal to about twice their length, but it may be less. The shell is relatively thick, and may or may not have a persistent plastral vacuity. In the adult, according to Rütimeyer, the carapace is considerably vaulted; and in specimens which he regards as belonging to male individuals it has a tendency to a cordiform shape. The plastral bridge is long, and usually extends from the 3rd to the 7th costal.

As was first pointed out by Rütimeyer [1], and subsequently more fully by Portis [2], some of the Chelonians from the Kimeridgian of Hanover, described by Maack under the preoccupied name of *Stylemys*, are referable to the present genus. The type of the genus *Chelonides*, Maack [3] (also preoccupied), of the same deposits, is a young shell, said to have been associated with a cranium [4]. In the carapace the vertebral shields are relatively wider than in young individuals of *Plesiochelys*, but the number of neurals is unknown. In an adult carapace, figured by Portis [5] under the same name (*Chelonides wittei*), the vertebral shields (more especially the 4th) are somewhat wider than in *Plesiochelys*, and the 8th costals meet in the middle line, as in *Hylæochelys*. Whether this form should constitute the type of a genus must for the present remain undecided.

### Plesiochelys solodurensis, Rütimeyer [6].

The type species. Carapace elongated and ovoid, vaulted in the male; neural bones elongated; vertebral shields relatively wide, extending about halfway across the costal bones, with the underlying areas fluted. Plastron long and narrow, fully ossified, with the sulcus dividing the abdominal and femoral shields ascending in an angular form on to the hypoplastrals; the postinguinal lobe long, and the anal shields extending on to the hypoplastrals.

[1] N. Denkschr. schw. Ges. Nat. vol. xxv. art. 2, pp. 140–142.
[2] Palæontographica, vol. xxv. art. 3, p. 131 *et seq.* (1878).
[3] *Ibid.* vol. xviii. p. 316(1869).—Preoccupied in 1834 for a genus of Lepidoptera.
[4] These specimens are figured by Portis, *op. cit.* pl. xvii.
[5] *Op. cit.* pl. xviii. fig. 1.
[6] N. Denkschr. schw. Ges. Nat. vol. xxv. art. 2, p. 29 (1873).

This is the commonest species found in the Lithographic Limestone.

*Hab.* Europe (Germany).

**R. 289.** The imperfect left hyoplastral; from the Lower Kimeridgian limestone of Bavaria. The visceral surface of this specimen agrees precisely with that of the corresponding part of the specimen figured by Rütimeyer in the 'N. Denkschr. schw. Ges. Nat.' vol. xxv. art. 2, pl. x. fig. 2; while the contour of the shields on the ventral surface is similar to that obtaining in the shell figured in pl. xii. of the same memoir. The greater part of the preaxillary portion is broken away.

*Egerton Collection. Purchased*, 1882.

### **Plesiochelys hannoverana** (Maack[1]).

Syn. *Stylemys hannoverana*, Maack[2].
*Plesiochelys hannoverana*, Portis[3].

Carapace very wide, with the neurals shorter than in other species. Plastron moderately wide, fully ossified, rounded at both extremities, with the sulcus dividing the abdominal and femoral shields ascending in a bold curve on the hypoplastrals, the postinguinal lobe short, and the anal shields confined to the xiphiplastrals. The form of the inframarginals is not shown.

*Hab.* Europe (Hanover).

**R. 297.** Cast of a slab of rock showing the ventral aspect of the nearly entire plastron. The original was probably obtained from the Lower Kimeridgian Lithographic Limestone of Hanover. The epi- and entoplastrals are wanting. This specimen accords closely with the entire plastron figured by Portis in the 'Palæontographica,' vol. xxv. pl. xvi. fig. 7. *Egerton Collection. Purchased*, 1882.

### **Plesiochelys** (?), sp.

The following specimens apparently belong to one or perhaps more species of *Plesiochelys*, which may be identical with Continental forms.

**44178 x.** The first neural bone; from the Kimeridge Clay of Weymouth, Dorsetshire. *Purchased*, 1878.

[1] Palæontographica, vol. xviii. p. 322 (1869).—*Stylemys.*
[2] *Loc. cit.* [3] *Ibid.* vol. xxv. art. 3, p. 131 (1878).

**44178 y.** A second or fourth neural bone; from Weymouth.
*Purchased*, 1878.

**44178 z.** A sixth or seventh neural bone: from Weymouth.
*Purchased*, 1878.

**43570.** The head of a humerus, probably referable to the present or an allied genus; from the Kimeridge Clay of Weymouth. This specimen agrees generally with the corresponding portion of the humerus of *Parachelys*, but indicates a larger specimen, and is widely different from the type of humerus referred to the *Acichelyidæ*.
*Purchased*, 1871.

### **Plesiochelys**, sp.

Known only by the plastron, which is fully ossified and of the elongated form characteristic of *P. solodurensis*, but with the anal shields confined to the xiphiplastral, although extending higher than in *P. hannoverana*. Of large size.
*Hab.* Europe (England).

**21351 x.** Slab exhibiting the dorsal aspect of the left hyoplastral; from the Purbeck of Swanage, Dorsetshire.
*Purchased*, 1847.

**23407 x.** Slab exhibiting the ventral surface of the right hypo- and xiphiplastral; from the Purbeck of Swanage. The areas occupied by the plastral and inframarginal shields are clearly shown. This specimen probably belongs to the same individual as the last, since it was purchased from the same dealer. Both specimens exceed in size the largest example of *P. solodurensis* figured by Rütimeyer. *Purchased*, 1849.

**R. 1515.** Slab exhibiting the ventral aspect of a left hypo- and xiphiplastral agreeing closely with the preceding specimen; from the Purbeck of Swanage. *No history.*

### **Plesiochelys valdensis**, Lydekker[1].

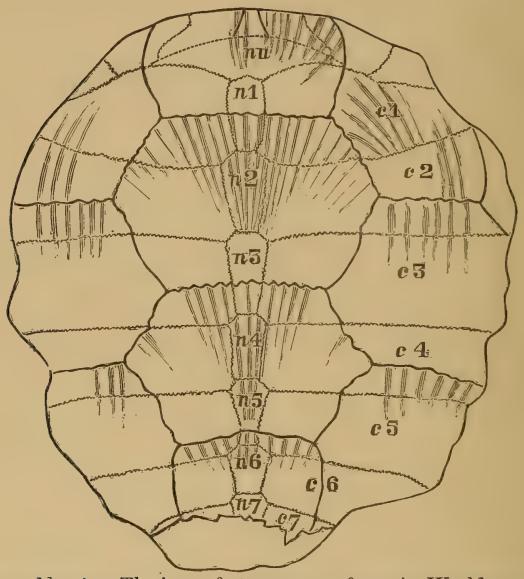
Apparently allied to the Lower Kimeridgian *P. sanctæ-verenæ*. Rütimeyer[2], but with the vertebral shields relatively narrower. Plastron wide and fully ossified, with the sulcus dividing the abdo-

[1] Quart. Journ. Geol. Soc. vol. xlv. p. 239 (1889).
[2] N. Denkschr. schw. Ges. Nat. vol. xxv. art. 2, p. 30, pl. xiii. (1873).

minal and femoral shields ascending much less than in *P. hannoverana*, the postinguinal lobe short and rounded, and the anal shields extending on to the hypoplastrals. The vertebral shields do not reach quite half across the costals, and the fluting of the underlying areas is strongly marked.

*Hab.* Europe (England).

Fig. 44.




*Plesiochelys valdensis.*—The imperfect carapace; from the Wealden of the Isle of Wight. ¼. *nu*, nuchal bone; *n* 1–*n* 7, neural bones; *c* 1–*c* 7, costal bones.

**28967.** (*Fig.*) The somewhat imperfect shell; from the Wealden of the Isle of Wight. The type specimen (fig. 44). Noticed by G. A. Boulenger and the present writer in the 'Geol. Mag.' dec. iii, vol. iv. p. 272, and provisionally referred to *P. sanctæ-verenæ*, and also by the present writer in the 'Quart. Journ. Geol. Soc.' vol. xlv. p. 238 (as No. 28976). The whole of the marginals are wanting, and the edges of the costals and plastron have been somewhat waterworn. The width of the second vertebral shield is equal to the length of that shield plus rather more than half that of the third vertebral, whereas in the type of *P. sanctæ-verenæ* the former diameter is relatively greater when compared with the length of the corresponding shields.

*Hastings Collection. Purchased*, 1855.

**Plesiochelys brodiei,** Lydekker[1].

Apparently allied to the Kimeridgian *P. solodurensis*, but with much narrower vertebral shields, in which the width only slightly exceeds the length. Plastron fully ossified, narrow, with the sulcus dividing the abdominal and femoral shields only slightly ascending on the hypoplastrals, the postinguinal lobe long, and the anal shields reaching on to the hypoplastrals. The vertebral shields do not extend more than $\frac{1}{3}$ across the costal bones, and the underlying areas are but slightly fluted.

*Hab.* Europe (England).

R. 1444. Cast of the greater portion of the shell, with the component bones of the carapace and anterior part of the plastron dislocated, and wanting some of the neurals and almost all the marginals. The original, which is the type, was obtained from the Wealden of Atherfield, Isle of Wight, and is in the collection of the Rev. W. P. Brodie of Rowington, Warwickshire. Restored figures of the carapace and plastron are given by the writer in the 'Quart. Journ. Geol. Soc.' vol. xlv. pp. 238, 239, figs. 4, 5. The boundaries of all the epidermal shields are distinctly shown. In the figure of the carapace the artist has introduced 12 marginals; while in that of the plastron the femoro-abdominal sulcus is represented as ascending too high.

*Made in the Museum*, 1889.

R. 583. The imperfect shell of a young individual probably belonging to this species; from the Wealden near Hastings, Sussex. Noticed by G. A. Boulenger and the present writer in the 'Geol. Mag.' dec. iii. vol. iv. p. 272, where it was considered to be specifically identical with the type of *P. valdensis*. The narrowness of the vertebral shields distinguishes it, however, at once from that species and allies it with the present one. The areas occupied by the 2nd, 3rd, and 4th vertebral shields are nearly entire; and three complete costals and marginals are preserved on the right side. The plastron is imperfect, but there appears to have been a small azygous shield between the pectorals.

*Presented by Sir R. Owen, K.C.B.*, 1884.

[1] Quart. Journ. Geol. Soc. vol. xlv. p. 238 (1889).

### Plesiochelys, sp.

The following specimen indicates an individual of larger size than the type of *P. valdensis*, to which species it shows affinity in the width of the vertebral shields.

*Hab.* Europe (England).

**37715.** Slab showing the dorsal surface of an imperfect 2nd or 4th costal; from the Wealden of Cuckfield, Sussex. The relatively lesser width of the vertebral shield distinguishes this specimen from *Hylæochelys*.
*Mantell Collection.* *Purchased*, 1853.

### Plesiochelys (?), sp.

From its elongated form the undermentioned specimen would appear to indicate a species of the present genus, which may be identical with the preceding form.

*Hab.* Europe (England).

**2298.** (*Fig.*) Slab exhibiting the dorsal aspect of an imperfect right hypoplastral; from the Wealden of Cuckfield, Sussex. Figured by Owen in his 'Wealden and Purbeck Reptilia' (Mon. Pal. Soc.), pt. i. pl. ix. fig. 4, as (?) *Chelone costata*.
*Mantell Collection.* *Purchased*, 1838.

*The following specimen is not generically determinable.*

**2336.** (*Fig.*) Slab exhibiting the dorsal aspect of a right hypoplastral; from the Wealden of Cuckfield. Figured by Owen, *op. cit.* pl. ix. fig. 2, as a hyoplastral of a species of *Platemys*.

Generically Undetermined Specimens from the Wealden, *some or all of which may belong to the* Plesiochelyidæ.

**2277.** (*Fig.*) The imperfect left hypoplastral; from Cuckfield, Sussex. Figured by Mantell in his 'Fossils of Tilgate Forest,' pl. vi. fig. 6. Inframarginal shields are shown.
*Mantell Collection.* *Purchased*, 1838

**2314.** (*Fig.*) An immature and imperfect left hypoplastral; from Cuckfield. Figured by Mantell, *op. cit.* pl. vii. fig. 5.
*Mantell Collection.*

**10824.** (*Fig.*) Fragment of rock showing the ventral surface of a costal of a very young Chelonian; from Cuckfield. Figured by Mantell, *op. cit.* pl. vii. fig. 1. *Mantell Collection.*

**2297.** Mass of rock showing the ventral aspect of an imperfect (*Fig.*) right scapulo-precoracoid; from Cuckfield. Figured by Mantell, *op. cit.* pl. vii. fig. 6. *Mantell Collection.*

**3522.** The imperfect proximal portion of a left femur; from Cuck- (*Fig.*) field. Figured by Mantell, *op. cit.* pl. viii. fig. 17. *Mantell Collection.*

**3569.** A fibula, imperfect proximally; from Cuckfield. Figured by (*Fig.*) Mantell, *op. cit.* pl. viii. fig. 15. *Mantell Collection.*

**3480.** An imperfect limb-bone, in matrix; from Cuckfield. Fig- (*Fig.*) ured by Mantell, *op. cit.* pl. viii. fig. 5. *Mantell Collection.*

**R. 1591.** An imperfect right humerus; from the Wadhurst Clay near Hastings. The head is large and subglobular. *Dawson Collection. Purchased*, 1889.

### Skulls of Mesozoic Chelonians.

Since there is at present no decisive evidence for referring the undermentioned skulls to genera founded upon the evidence of the shell, the whole of them are mentioned under one heading without any attempt at referring them to their respective genera.

**R. 1510.** Cast of an imperfect skull. The original was obtained from the Lower Kimeridgian Lithographic Limestone of Bavaria. It is figured by Cuvier in his 'Ossemens Fossiles,' 2nd ed. vol. v. pt. ii. pl. xv. fig. 7, and again by Rütimeyer in the 'N. Denkschr. schw. Ges. Nat.' vol. xxv. art. 2, pl. xiv. fig. 5, where it is provisionally referred to *Tropidemys*. The grounds of this reference appear to be the comparatively large size of the specimen and its vaulted contour. The specimen presents a considerable apparent resemblance to the larger skull from the Portlandian figured by Owen in his 'History of British Fossil Reptiles,' Chelonia, pl. viii. figs. 1–3, as *Chelone planiceps*[1], and subsequently made the type of the provisional genus *Stegochelys*[2]. According, however, to Rütimeyer the present specimen has no distinct nasals. The temporal fossa is extensively roofed. *Mantell Collection. Purchased*, 1838.

[1] Rep. Brit. Assoc. for 1841, p. 168 (1842).

[2] Lydekker, Quart. Journ. Geol. Soc. vol. xlv. p. 229 (1889).—See Addenda.

**R. 248.** Cast of an imperfect skull. The original was obtained from the Lithographic Limestone of the Continent, and is figured by Rütimeyer, *op. cit.* pl. xiv. figs. 1, 2, where it is provisionally referred to *Plesiochelys*. The chief ground for this reference appears to be the depressed contour of the cranium. The palatines are separated in the middle line by the vomer; the pterygoids are of moderate width and deeply emarginate. There appear to be no distinct nasals, and the temporal fossæ were more or less roofed.

*Egerton Collection. Purchased*, 1882.

**R. 463.** Cast of a cranium. The original was obtained from the Middle Purbeck of Durdlestone Bay, Swanage, Dorsetshire. This specimen is probably flattened by pressure. It presents some approximation to the preceding; but the orbits are nearer to the nares. The roof of the temporal fossa is very short.

*Presented by Sir R. Owen, K.C.B.*, 1884.

**21974 x.** Slab exhibiting the oral aspect of an imperfect mandible; from the Purbeck of Swanage, Dorsetshire. The articular region is wanting. *Purchased*, 1848.

**R. 1523.** An imperfect mandible, in matrix; from the Purbeck of Swanage. *No history.*

**44815.** Fragment of rock showing the ventral aspect of a nearly similar mandible; from the Purbeck of Swanage. The articular surface would appear to be of the Cryptodiran type. *Presented by B. Bright, Esq.*, 1873.

## Section IV. AMPHICHELYDIA.

This name has been proposed[1] to include a number of generalized later Mesozoic forms which may be regarded as allied to the earlier (and at present unknown) progenitors of the Pleurodira and Cryptodira.

They are characterized by having a shell constructed on the plan of that of the Cryptodira and Pleurodira, in which mesoplastral

[1] Lydekker, Quart. Journ. Geol. Soc. vol. xlv. p. 518 (1889).

bones and an intergular shield are developed. The pubis may articulate, without sutural union, with the xiphiplastral.

The skull and neck are unknown. The coracoid and humerus (when known) are of a Pleurodiran type.

## Family PLEUROSTERNIDÆ.

For the present the whole of the members of this group may be classed in a single family, which will embrace the *Baënidæ* of Cope. The latter family was taken to include *Platychelys* (*infrà*) and *Baëna*, Leidy [1], of the Eocene of the United States. In *Baëna* the intergular shield is divided, and according to Cope [2], who remarks on its generalized affinities, there are depressions on the xiphiplastral which appear to have received the ischium and pubis.

### Genus **PLEUROSTERNUM,** Owen [3].

Syn. *Megasternum*, Gray [4].
*Digerrhum*, Cope [5].

Carapace much depressed, smooth, and rounded posteriorly. Neurals moderately elongated, hexagonal, with their antero-lateral surfaces short. Mesoplastrals complete (fig. 45); entoplastral relatively large; xiphiplastrals deeply notched. No nuchal shield; vertebral shields considerably wider than long; intergular not divided; inframarginals present. An articulation between the pubes and the xiphiplastrals (fig. 46). Coracoid much expanded distally; scapulo-precoracoid with pedunculate glenoid cavity, and a right angle at the junction of the two component bones. Humerus of a Pleurodiran type.

The surface of the shell is very finely pitted.

The pectoral girdle closely resembles that of *Chelys*, although approximating to *Hydraspis* in the pedunculate glenoid cavity. Frequently the 8th neural coalesces with the first suprapygal.

[1] Rep. Geol. Survey of Wyoming, 1870, p. 367.—*Bæna.*

[2] Rep. U. S. Geol. Surv. Terrs. vol. iii. p. 145 (1884).

[3] Wealden and Purbeck Reptilia (Mon. Pal. Soc.), pt. i. p. 2 (1853).—Amended from *Pleurosternon*.

[4] Cat. Tortoises &c. Brit. Mus. p. 45 (1844). See also Supplement Cat. Shield Rept. pt. i. p. 77 (1870). Original description insufficient and inexact; the name (*Megasternum*) is occupied by Mulsant, Hist. Nat. des Coléoptères de France, Palpicornes (1844), which may be earlier than Gray's name, which did not appear till after July 1844.

[5] Trans. Amer. Phil. Soc. vol. xiv. pt. i. p. 156 (1870).

### **Pleurosternum bullocki** (Owen [1]).

Syn. *Platemys bullocki*, Owen [2].
*Megasternum koenigi*, Gray [3].
*Pleurosternum concinnum*, Owen [4].
*Pleurosternum ovatum*, Owen [5].
*Pleurosternum emarginatum*, Owen [6] (*in parte*).
*Platemys concinna*, Maack [7].
*Platemys ovata*, Maack [8].
*Digerrhum bullocki*, Cope [9].

The type species. Of large size; the carapace of adult individuals attaining a length of about 0,480 (19 inches). Entoplastral usually much wider than long, and intergular shield of a regular shield-shape.

The whole of the specimens described under the above-mentioned name are, at least provisionally, included under a single species, since there are no valid characters by which they can be distinguished.

In the young the first pair of marginals encroach to such a large extent on to the anterior border of the nuchal as to leave only a very small portion free. This condition may perhaps have persisted in the type carapace of *P. concinnum* [10]. The bridge was also relatively shorter in the young than in the adult. In extremely young individuals the vertebral shields of the carapace appear to have been divided mesially. Although there is a certain amount of variation in the relative width of the plastron of different specimens, yet there is such a gradual transition from one to another that it appears impossible to found satisfactory specific differences on such characters, and the whole of the specimens are therefore provisionally included under one name. In the figure of the type plastron of *P. concinnum* the two diameters of the entoplastral are represented as nearly equal; but it appears from the text that the transverse is in reality the longer of the two.

[1] Rep. Brit. Assoc. for 1841, p. 164 (1842).—*Platemys*. [2] *Loc. cit.*
[3] Cat. Tortoises &c. Brit. Mus. p. 45 (1844).
[4] Wealden and Purbeck Reptilia (Mon. Pal. Soc.), pt. i. p. 3 (1853).
[5] *Ibid.* p. 8. [6] *Ibid.* pls. v., vi.
[7] Palæontographica, vol. xviii. p. 288 (1869). [8] *Ibid.* p. 293.
[9] Trans. Amer. Phil. Soc. vol. xiv. pt. i. p. 156 (1870).
[10] Owen's 'Wealden and Purbeck Reptilia,' pl. ii. It might be urged that this should be considered as a specific distinction. Since, however, this feature occurs in all young individuals and is unknown in any other adult carapace, it can only be regarded as an abnormality, even if the figures be correct, and there is some confusion therein between sutures and sulci.

The genus *Digerrhum* was founded on the erroneous supposition that the intergular shield is absent in *Pleurosternum* (as typified by *P. concinnum*); the former genus was referred by its founder to the *Sternothœridæ* = *Pelomedusidæ*, while the latter was made the type of a family of Cryptodira [1].

The names *Pleurosternum sedgwicki*, *P. vansittardi*, *P. oweni*, and *P. typocardium* have been applied by Seeley [2] to specimens from the Purbeck preserved in the Woodwardian Museum, Cambridge. It is, however, impossible to determine from the description whether any of these are entitled to specific distinction from *P. bullocki*, or whether, indeed, they are all referable to this genus, some of them being compared to *Hylæochelys latiscutata*.

This species appears to be the most common Purbeck Chelonian.

*Hab.* Europe (England).

**46317.** (*Fig.*) The somewhat imperfect and flattened shell; from the Purbeck of Swanage, Dorsetshire. The carapace is figured by Owen in his 'Wealden and Purbeck Reptilia' (Mon. Pal. Soc.), pt. i. pl. v., and the plastron in pl. vi., under the name of *Pleurosternum emarginatum*; the specimen being incorrectly described as being in the collection of Mr. Wilcox of Swanage. The ventral aspect is also figured in Owen's 'Palæontology,' 2nd ed. p. 318, fig. 109, with the omission of the intergular shield. This specimen is important as exhibiting the carapace and plastron in connection. The plastron presents no characters by which it can be specifically distinguished from the undermentioned type specimen, although the entoplastral is relatively smaller. The carapace, in which the nuchal is wanting, accords with the next specimen. The 8th neural is confluent with the anterior suprapygal (9 of Owen's figure), although they are represented in the figure as distinct. *Cunnington Collection. Purchased*, 1875.

**43621.** A flattened and somewhat imperfect shell; from the Purbeck of Swanage. The characteristic form of the nuchal and entoplastral is clearly shown. *Purchased*, 1872.

**35574.** Slab showing the dorsal aspect of the nearly entire carapace; from the Purbeck of Swanage. The nuchal is relatively narrow; the 8th neural is distinct from the suprapygal. *Purchased. About* 1860.

[1] For fuller details on the above-mentioned points reference may be made to the 'Quart. Journ. Geol. Soc.' vol. xlv. pp. 514, 515.

[2] Index to Aves, &c., in Cambridge Museum, pp. 86, 87 (1869).

28618*. (*Fig.*) Slab showing the dorsal aspect of the entire carapace; from the Purbeck of Dorsetshire. Figured by Owen, *op. cit.* pl. vii. as *Pleurosternum ovatum*, of which it is the type. The 4th neural is absent, so that the 4th costals meet in the median line; the 8th neural is small and distinct from the suprapygal. The nuchal is as wide as in No. 38733 but has no distinct emargination.

*Willcox Collection. Purchased*, 1853.

47401. An imperfect and flattened carapace apparently belonging to this species; from Swanage. The nuchal is wanting. The ventral surface shows that the ilium had but a small osseous connection with the 8th costal.

*Purchased*, 1876.

38733. Slab exhibiting the dorsal aspect of the somewhat imperfect carapace; from Swanage. The nuchal is relatively wide and slightly emarginate; and the 8th neural is exceedingly minute. *Purchased*, 1865.

21351*. Slab showing the dorsal surface of an imperfect carapace in which the nuchal is wanting; from Swanage.

*Purchased*, 1847.

28619. Slab showing the dorsal surface of the posterior extremity of the carapace; from the Purbeck of Swanage. This specimen shows the 7th and 8th neurals, suprapygals, and the 7th and 8th costals, together with the detached 6th costal of the right. The 8th neural has coalesced with the 1st suprapygal. *Willcox Collection.*

24298. Slab showing portions of the carapace; from the Purbeck of Swanage. The ventral aspect of the posterior extremity is well displayed. The small surfaces for iliac attachment are shown; and the ilium and ischium of the right side are also preserved, the distal extremity of the latter being expanded. *Cunnington Collection. Purchased*, 1849.

38733. Slab exhibiting the dorsal aspect of the imperfect carapace, the ventral surface of the right side of the posterior half of the plastron, and the pectoral girdle of the left side; from the Purbeck of Swanage. The coracoid is greatly expanded distally, and closely resembles that of *Chelys*; but the scapulo-precoracoid (as shown by No. 48351, *infrà*)

has a pedunculate glenoid cavity, as in *Hydraspis*, where, however, the scapula and precoracoid form an acute, instead of a right angle at their junction.

*Purchased*, 1865.

**40676.** Slab showing the dorsal aspect of the imperfect carapace; from the Purbeck of Swanage. The middle line is somewhat damaged. *Purchased*, 1867.

**40960.** Slab exhibiting the dorsal surface of the imperfect posterior portion of the carapace, and the ventral surface of the associated plastron; from the Purbeck of Swanage. The xiphiplastrals are wanting; the entoplastral exhibits the characteristic breadth. *Purchased*, 1868.

**R. 911.** (*Fig.*) The plastron, imperfect posteriorly; from the Purbeck of Swanage. The type specimen; figured by Owen in his 'Reptilia of the London Clay, &c.' (Mon. Pal. Soc.), vol. i. pt. i. pl. xxi., where it is incorrectly stated to have been obtained from the London Clay. It is also described by the same writer in the 'Rep. Brit. Assoc.' for 1841, p. 164; and is noticed by Rütimeyer in the 'N. Denkschr. schw. Ges. Nat.' vol. xxv. art. 2, pp. 159–160, who first pointed out its close resemblance to the plastron of No. 46317, and stated that it must clearly be referred to the genus *Pleurosternum*. The specimen is again noticed by G. A. Boulenger and the present writer in the 'Geol. Mag.' dec. iii. vol. iv. p. 271 (1887), where its true geological horizon is mentioned.

*Purchased at the sale of Bullock's Museum.*

**46832.** The plastron, imperfect posteriorly; from Swanage. The specimen is broken off across the hypoplastral, the fracture on the right side extending into the mesoplastral. On the inner aspect there is preserved the crushed pectoral girdle of the left side, together with the proximal half of the humerus. The expanded contour of the coracoid can still be clearly seen. *Purchased*, 1875.

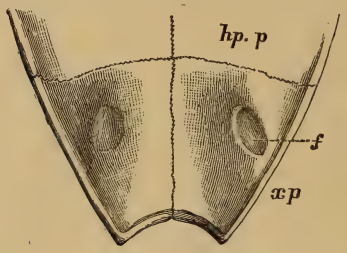
**R. 1524.** (*Fig.*) Slab containing the imperfect plastron; from Swanage. The left hyoplastral is detached and seen from the ventral aspect. The meso- and hypoplastrals are also exhibited chiefly from the ventral aspect; but the distal portion of the hypoplastrals and the xiphiplastrals has been cleared from matrix in order to exhibit the articular facets

on the latter for the pubis. This portion of the specimen (fig. 45) has been figured by the writer in the 'Quart. Journ. Geol. Soc.' vol. xlv. p. 517, fig. 4. *No history.*

**24816.** The anterior extremity of the plastron; from Swanage. Both surfaces are exhibited. *Purchased*, 1849.

**35772.** Slab exhibiting the ventral aspect of the plastron; from the Purbeck of Swanage. This specimen is rather narrower than the preceding; while the entoplastral is relatively

Fig. 45.




*Pleurosternum bullocki.*—Dorsal aspect of the posterior extremity of the plastron; from the Purbeck of Swanage, ¼. *hp.p*, hypoplastral; *xp*, xiphiplastral; *f*, facet for pubis.

less wide, and the lateral borders of the xiphiplastrals are somewhat more emarginate. These differences cannot, however, be regarded as of more than individual, or perhaps sexual, value; the width of No. R. 911 has moreover been increased by pressure. *Purchased*, 1860.

**28433.** (*Fig.*) Slab showing the ventral aspect of the plastron of an immature individual, together with three marginals of the left side; from the Purbeck of Swanage. Figured in woodcut fig. 46. The great breadth of the entoplastral is well shown. The middle region is not quite fully ossified. *Purchased*, 1853.

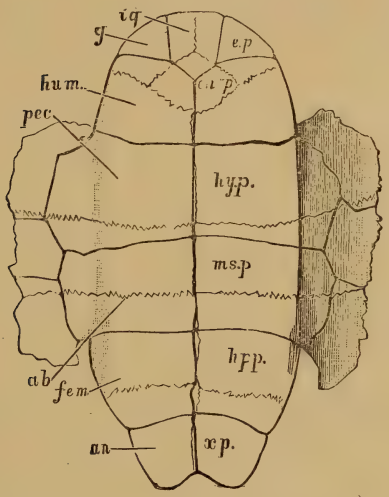
**40646.** Slab showing the ventral aspect of a plastron agreeing in size with the preceding specimen, together with many of the marginal bones of the carapace; from Swanage. The entoplastral is less wide than in the preceding specimen. In the marked lateral emargination of the xiphiplastrals and the contour of their terminal notch this specimen closely accords with the type plastron of *P. concinnum*. *Purchased*, 1867.

**46324.** Slab showing the ventral aspect of the hinder extremity of the left half of the plastron; from Swanage. The whole of the meso- and hypoplastrals are shown, but the extremity of the xiphiplastral is broken away.

*Cunnington Collection.*

**48262.** (*Fig.*) Slab showing the imperfect shell of a young individual; from the Middle Purbeck of Durdlestone Bay, Swanage. Figured by the writer in the 'Quart. Journ. Geol. Soc.' vol. xlv. p. 516, fig. 3. The costals and marginals (excepting the first) of the right side have been chiselled away

Fig. 46.




*Pleurosternum lullocki.*—The plastron; from the Purbeck of Swanage. About ½. *ig*, intergular shield; *g*, gular shield; *hum*, humeral shield; *pec*, pectoral shield; *ab*, abdominal shield; *fem*, femoral shield; *an*, anal shield; *e.p*, epiplastral bone; *entp*, entoplastral bone; *hy.p*, hyoplastral bone; *ms.p*, mesoplastral bone; *hpp*, hypoplastral bone; *xp*, xiphiplastral bone.

in order to exhibit the dorsal aspect of the bones of the plastron. The large size of the nuchal and the encroachment of the first pair of marginal bones on to its anterior border, characteristic of young specimens, are well shown. The costal shields are relatively much wider than in the adult, the marginal shields appearing to encroach more on the carapace as age advances. The first vertebral shield is also relatively wider than in the adult, its width largely exceeding that of the other shields. Again,

the 1st marginal bone articulates almost wholly with the nuchal, whereas in the adult it has a long articulation with the 1st costal. The relative shortness of the bridge is indicated. The xiphiplastral is devoid of any facet for articulation with the pubis. The great relative antero-posterior diameter of the first pair of marginal shields is very characteristic.

*Beckles Collection. Purchased*, 1877.

**48263.** Slab showing the dorsal aspect of a similar but rather smaller carapace; from Durdlestone Bay. This specimen has been somewhat crushed and the contour of the vertebral shields is not clearly shown. The marginals are wanting and the nuchal is imperfect; the contour of the latter is, however, the same as in the preceding specimen.

*Beckles Collection.*

**48353.** Slab showing an imperfect shell agreeing precisely with No. 48262; from Durdlestone Bay. The dorsal aspect of the greater part of the carapace is shown, but the nuchal is wanting. The right humerus is seen on the left side of the carapace. *Beckles Collection.*

**48354.** Slab showing an imperfect shell of rather smaller size than No. 48263; from Durdlestone Bay. The dorsal surface of the imperfect carapace and the ventral aspect of the plastron are exhibited. In the latter the mesoplastrals terminate externally in a point. The scapulo-precoracoid of one side is also shown. *Beckles Collection.*

**48347.** Slab exhibiting the ventral aspect of an imperfect plastron agreeing approximately in size with No. 48262; from Durdlestone Bay. The ento- and epiplastrals are wanting, and the xiphiplastrals are imperfect. The bridge is relatively much shorter than in adult specimens, its length being only equal to half the inter-inguinal diameter of the hypoplastrals. The mesoplastrals terminate externally in a point, and apparently permitted the hyo- and hypoplastrals to come almost or quite into contact at their outer extremities. *Beckles Collection.*

**48343.** Slab exhibiting the ventral surface of a somewhat smaller imperfect plastron and other bones; from Durdlestone Bay. The xiphiplastrals and the right hypoplastral are imperfect. The mesoplastrals, although pointed externally,

completely separate the hyo- and hypoplastrals. The intergular shield does not extend on to the entoplastral, as it does in adult examples. The slab also shows the three anterior marginals of one side, the first of which agrees with the corresponding bone in No. 48262; and a scapulo-precoracoid. *Beckles Collection.*

**48346.** Slab exhibiting the dorsal aspect of the right hyoplastral of an individual of somewhat larger size than No. 48347; from Durdlestone Bay. *Beckles Collection.*

**48263 c.** Slab showing the dorsal aspect of the imperfect carapace of a very young individual; from Durdlestone Bay. The component bones are dislocated, the posterior extremity is wanting, and the nuchal is imperfect. The areas of the first three vertebral shields (which are relatively wider than in No. 48262) are shown; and the nuchal and neural bones are traversed by a median sulcus, which apparently indicates that the vertebral shields were divided. *Beckles Collection.*

**48263 a.** Slab showing the dorsal aspect of a similar imperfect carapace; from Durdlestone Bay. The vertebral shields appear relatively shorter than in the preceding specimen, but this is owing to the circumstance that the bones are not dislocated. The nuchal is wanting. *Beckles Collection.*

**48263 e.** Slab showing an imperfect carapace and plastron agreeing in size with the preceding specimen; from Durdlestone Bay. The ridged sculpture characteristic of very young individuals is more marked than in the preceding specimens. *Beckles Collection.*

**48344.** Slab exhibiting the ventral surface of an imperfect plastron, together with some costal bones, of an individual agreeing in size with the preceding. The mesoplastral is well shown. *Beckles Collection.*

**48351.** Slab showing the dorsal surface of the right scapulo-precoracoid; from Swanage. This specimen precisely agrees with the corresponding bone in No. 38733, but shows the marked pedunculation of the glenoid cavity. *Beckles Collection.*

**R. 923.** Slab exhibiting the ventral aspect of the left scapulo-precoracoid; from Swanage. *No history.*

**48252.** Fragment of rock exhibiting the ventral surface of the right scapulo-precoracoid of an immature individual; from Durdlestone Bay. The distal half of the scapula is wanting. *Beckles Collection.*

**48252 a.** Fragment of rock showing the dorsal aspect of a smaller and imperfect left scapulo-precoracoid; from Durdlestone Bay. Resembles the corresponding bone in No. 48343. *Beckles Collection.*

**R. 1556.** Slab showing the dorsal aspect of the left humerus, in a somewhat crushed condition; from Swanage. Except for its larger dimensions this specimen can scarcely be distinguished from the humerus of *Chelys*. It agrees precisely in characters with the small humerus in No. 48353, and, apart from this, the common occurrence of this type of humerus in the Purbeck leaves no doubt but that it belongs to the present genus. *No history.*

**24816.** Slab exhibiting the dorsal aspect of a slightly smaller left humerus in a less crushed condition; from Swanage. *Cunnington Collection.*

**R. 640.** Slab exhibiting the dorsal aspect of a similar left humerus; from Swanage. *Presented by J. E. Lee, Esq.*, 1884.

**44816.** Slab showing the ventral aspect of a crushed left humerus; from Swanage. *Presented by B. Bright, Esq.*, 1873.

**R. 1360.** Slab exhibiting the ventral aspect of a rather smaller left humerus; from Swanage. *Harford Collection. Purchased*, 1888.

**48364.** Slab exhibiting the dorsal surface of the imperfect right humerus; from Swanage. This specimen, of which the head is wanting, agrees nearly in size with No. R. 1556, but has not suffered from crushing. *Beckles Collection.*

**48268.** The right humerus of a very young individual, in matrix; from Durdlestone Bay. The ventral aspect is exposed. *Beckles Collection.*

**48267.** A slightly smaller left humerus, in matrix; from Durdlestone Bay. The dorsal surface is shown. *Beckles Collection.*

**48266.** Slab showing the ventral aspect of the left femur, in a crushed condition; from Durdlestone Bay. *Beckles Collection.*

**48369.** Slab exhibiting the inner or tibial aspect of the left femur; from Durdlestone Bay. The middle of the shaft retains its original contour, but the extremities have been crushed and broken. *Beckles Collection.*

**48269.** Several phalangeals belonging to adult individuals; from Durdlestone Bay. *Beckles Collection.*

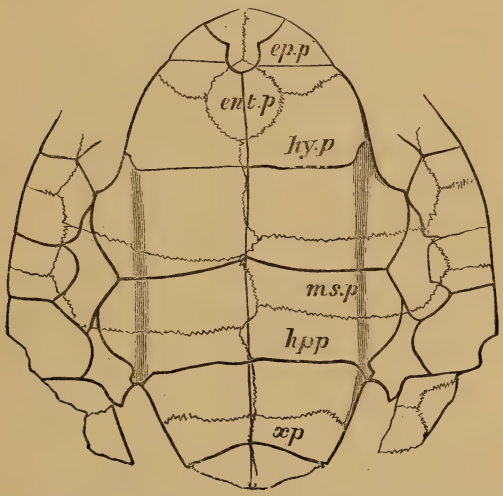
**Pleurosternum portlandicum,** Lydekker, n. sp.

Distinguished from *P. bullocki* by the equality in the two diameters of the entoplastral bone, and by the narrower and pyriform intergular shield.

The type and only known specimen indicates, if adult, a comparatively small form. Other specimens are required to illustrate the full affinity of this form, which, from its much lower geological horizon, may be regarded as distinct from the type species.

*Hab.* Europe (England).

Fig. 47.




*Pleurosternum portlandicum.*—The plastron and adjacent marginals; from the Portland Oolite. ¼. *ep.p*, epiplastral; *ent.p*, entoplastral; *hy.p*, hyoplastral; *ms.p*, mesoplastral; *hp.p*, hypoplastral; *xp*, xiphiplastral.

**44807.** (*Fig.*) Slab exhibiting the ventral aspect of the imperfect plastron, together with several of the marginals of the left side; from the Portland Oolite of the Isle of Portland, Dorsetshire. The type specimen; figured in the accompanying

woodcut. The pyriform shape of the intergular shield is distinctly shown. The transverse diameter of the entoplastral only very slightly exceeds the vertical. The inframarginal shields differ somewhat in their mode of arrangement from those of the type specimen of the so-called *P. concinnum*, but this is not necessarily a specific character. *Presented by B. Bright, Esq.*, 1874.

## Genus **PLATYCHELYS,** Wagner[1].

Syn. *Helemys,* Rütimeyer[2].

Carapace somewhat depressed, with a number of more or less distinct ridges or prominences on the neurals and costals. Neurals short and of irregular contour, the width usually much exceeding the length. Bridge short. Mesoplastrals not meeting in the middle line. Vertebral shields much wider than long; a nuchal shield; intergular undivided[3]. No articulation between pelvis and plastron.

### **Platychelys oberndorferi,** Wagner[4].

Syn. *Helemys serrata,* Rütimeyer[5].

The type species. Length of carapace averaging 0,241 (9·5 inches). Carapace subcordiform; neural bones without continuous median keel; neurals and costals of same approximate antero-posterior diameter, and consequently each neural articulating chiefly with its corresponding costals. Prominences on carapace very strongly developed, and the posterior border of the latter serrated.

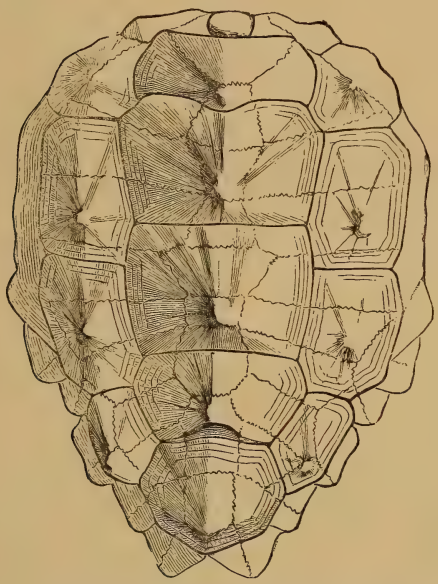
*Hab.* Europe (Bavaria and France).

**49156.** Cast of a slab exhibiting the dorsal aspect of the nearly entire carapace. The original was obtained from the Lower Kimeridgian Lithographic limestone of Kelheim, Bavaria, and is preserved in the Museum at Munich. It is figured by Wagner in the 'Abh. k. bay. Ak. Wiss.' vol. ix. pt. i. pl. i., from which figure the accompanying woodcut is reduced. Other specimens are figured by Rütimeyer in the 'N. Denksch. schw. Ges. Nat.' vol. xxii. art. 5, pls. iii., iv. (1867), which show that the form of the neural bones is subject to variation, and also exhibit the structure of the plastron. *Purchased,* 1878.

[1] Abh. k. bay. Ak. Wiss. vol. vii. pt. i. p. 242 (1853).
[2] Verh. schw. Ges. Nat. 1859, p. 58.
[3] *Vide* Zittel, Palæontographica, vol. xxiv. pl. xxviii.
[4] *Loc. cit.* [5] *Loc. cit.*

**50116.** Slab showing the dorsal surface of the imperfect anterior portion of the carapace; from the Lower Kimeridgian Lithographic limestone of Kelheim, Bavaria. This specimen shows the first four neural bones and portions of the first five costals. The entire area occupied by the second vertebral shield is also exhibited. *Purchased*, 1879.

Fig. 48.



*Platychelys oberndorferi.*—The dorsal aspect of the carapace; from the Lower Kimeridgian of Bavaria. (*After Wagner.*)

### **Platychelys (?) anglica,** Lydekker.

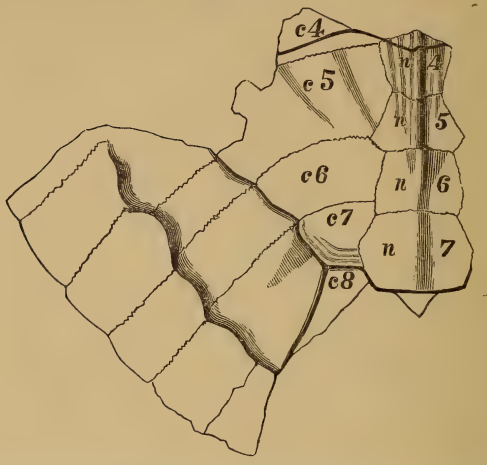
Typically of smaller size than the preceding species; neural bones with a continuous median keel; neurals in posterior half of carapace not corresponding in antero-posterior diameter with the costals, and consequently several of the neurals articulating extensively with other than their corresponding costals. Prominences and hollows on the carapace much less developed than in the type species, and posterior border of carapace entire.

*Hab.* Europe (England).

**48357.** (*Fig.*) Slab showing the imperfect posterior portion of the carapace; from the Middle Purbeck of Durdlestone Bay, Dor-

setshire. The type specimen (fig. 49). The fourth to the seventh neurals are shown, with the corresponding costals and marginals of the left side. The 4th neural articulates extensively with the 5th costal, while the 5th

Fig. 49.




*Platychelys* (?) *anglica*.—Part of the posterior region of the carapace; from the Purbeck of Dorsetshire. ⅔. *n* 4–*n* 7, neurals; *c* 4–*c* 8, costals.

neural articulates largely with the 5th and, to a smaller extent, with the 6th costal. Portions of the areas occupied by the 3rd, 4th, and 5th vertebral shields are exhibited. *Beckles Collection. Purchased*, 1877.

Family *non det.*

Genus **ARCHÆOCHELYS,** Lydekker[1].

Very imperfectly known. Plastron with a series of median (? azygous) shields (intergular, interpectoral, interabdominal, and interfemoral) dividing the normal shields; intergular apparently placed behind the gular, as in *Chelodina*. Hyoplastral apparently taking no part in the formation of the axillary notch, which was probably constituted by the mesoplastral, as in *Sternothærus*. The plastron must have been of a long and narrow type. It has been suggested that the carapace of this form may have had a series of intervertebral shields, as in the carapace figured by Portis in the 'Palæontographica,' vol. xxv. pl. xv., and referred to *Tropidemys*.

This form is only provisionally referred to the present group.

[1] Geol. Mag. dec. iii. vol. vi. p. 377 (1889).

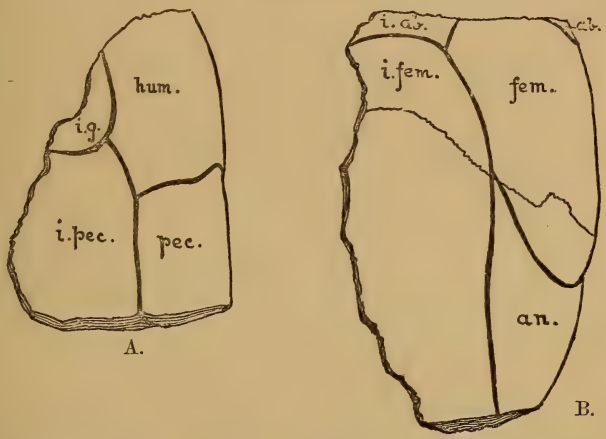
The evidence for the presence of mesoplastrals is on the assumption that the hyoplastrals are entire; if, however, these specimens are only the anterior part of the hyoplastral, there would be no evidence for the presence of those elements.

**Archæochelys valdensis,** Lydekker [1].

The type and only described species.

*Hab.* Europe (England).

Fig. 50.




*Archæochelys valdensis.*—A. Left hyoplastral (?); *i.g*, intergular shield; *hum*, humeral do.; *pec*, pectoral do.; *i.pec*, interpectoral do. B. The imperfect posterior extremity of the left side of the plastron; *i.ab*, interabdominal shield; *ab*, abdominal do.; *fem*, femoral do.; *an*, anal do.; *i.fem*, interfemoral do. From the Wealden of Cuckfield. $\frac{2}{3}$.

**3532.** (*Fig.*) A bone which appears to be the nearly entire hyoplastral of the left side; from the Wealden of Cuckfield, Sussex. One of the types; figured by the writer in the 'Quart. Journ. Geol. Soc.' vol. xlv. p. 512, fig. 2. The areas occupied by the humeral, pectoral, intergular, and interpectoral shields are more or less fully shown (fig. 50, A).

*Mantell Collection. Purchased*, 1838.

**3533.** (*Fig.*) A somewhat smaller specimen of the homologous bone; from Cuckfield. Figured by Mantell in his 'Fossils of Tilgate Forest,' pl. vii. fig. 3, without name, and noticed by the writer, *loc. cit.* The median series of shields is relatively narrower, and the lateral series broader than in the preceding specimen. *Mantell Collection.*

[1] Geol. Mag. dec. iii. vol. vi. p. 377 (1889).

**3506.** The imperfect left hypo- and xiphiplastral; from Cuckfield. (*Fig.*) One of the types; figured by the writer, *op. cit.* p. 511, fig. 1; reproduced in fig. 50, B. The proximal portion of the hypoplastral, which is presumed to have formed the inguinal notch and buttress, is broken away. Portions of the areas occupied by the abdominal, femoral, anal, interabdominal, and interfemoral shields are shown.

*Mantell Collection.*

**3529.** An imperfect bone, provisionally regarded as a portion of the left mesoplastral of this form; from Cuckfield. This specimen shows a portion of the axillary buttress and parts of the areas covered by one median and two lateral shields.

*Mantell Collection.*

**43626 x.** A marginal bone, not improbably referable to this form; from Cuckfield. This specimen would agree in relative size with the plastron. *Purchased,* 1859.

The following genera are far too imperfectly known to admit of any definite opinion being formed as to their serial position or affinities, the second one being apparently extremely aberrant.

## Genus **PROTOCHELYS,** Lydekker (n. gen.).

A provisional genus, known by the impressions of the horny shields of the carapace, and probably by part of the pectoral girdle. The vertebral shields are of great relative width and markedly carinated. In these respects they approximate to those of the existing *Geoemyda*, and indicate that the neural bones of the carapace were likewise strongly carinated. The coracoid, which probably belongs to this form, is of the expanded type found in *Chelys* and *Pleurosternum*.

### **Protochelys stricklandi** (Phillips [1]).

Syn. *Testudo stricklandi,* Phillips [2].
? *Chelys* (?) *blakei,* Mackie [3].

The type species; probably with a shell of about 10 inches in length. If the undermentioned coracoid belong to this form, the specific name *blakei* should be adopted.

*Hab.* Europe (England).

[1] Geology of Oxford, p. 182 (1871).—*Testudo.*
[2] *Loc. cit.* [3] Geologist, 1863, p. 41.

All the following specimens were obtained from the Lower Jurassic of Stonesfield, Oxfordshire. The first record of the occurrence of a similar specimen in these deposits is given by Owen in the 'Rep. Brit. Assoc.' for 1841, p. 160; and the undermentioned specimens include those noticed by Blake in the 'Geologist,' 1863, p. 183.

**37218.** A split slab showing the impressions of the two surfaces of one of the first four vertebral shields. *Purchased*, 1863.

**37218 a.** Slab showing the impression of a somewhat larger vertebral shield of the same general type. *Purchased*, 1863.

**R. 247.** A split fragment of rock showing the impressions of the two surfaces of the imperfect right half of a nearly similar shield. The markings are well preserved.
*Egerton Collection. Purchased*, 1882.

**R. 247 a.** Fragment showing the impression of an imperfect vertebral shield. Part of the left side is wanting. This specimen was probably the fourth vertebral. *Egerton Collection.*

**37218 b.** A split slab showing the impressions of the two surfaces of the fifth vertebral shield. In contour this specimen accords with the type vertebrals figured by Phillips in his 'Geology of Oxford,' p. 182, diagram xli. *Purchased*, 1863.

**R. 247 b.** A split slab showing the impressions of the two surfaces of one of the first three costal shields. The small extent of the transverse diameter is well shown.
*Egerton Collection.*

**39198.** Fragment of rock showing the impression of the outer surface of a fourth costal shield.
*Bowerbank Collection. Purchased*, 1865.

**39198 a.** Fragment of rock with the impression of the outer surface of a small shield. *Bowerbank Collection.*

**37979.** (*Fig.*) Fragment of rock showing one side of an imperfect coracoid not improbably belonging to this form. Figured by Mackie in the 'Geologist' for 1863, p. 41, as *Chelys* (?) *blakei*, of which it is the type. In its expanded distal extremity this specimen resembles the coracoids of *Chelys* and *Pleurosternum*, but there is a longer interval between the glenoidal extremity and the distal expansion.
*Purchased*, 1863.

**R. 896.** Fragment of rock showing one surface of a bone which is apparently a Chelonian scapulo-precoracoid, and is probably referable to this form. The greater part of the precoracoid is wanting. *Wright Collection. Purchased*, 1887.

## Genus **CHELYTHERIUM**, Meyer[1].

Known by fragments of the skeleton, which are too imperfect to admit of any opinion being formed as to the affinity of their owner. According to its describer, *Proganochelys quenstedti*, Baur[2], from the Keuper of Würtemberg, is certainly distinct from this form and is referred to the Pleurodira. The type specimen of the latter is figured by Quenstedt[3] under the name of *Psammochelys keuperina*.

### **Chelytherium obscurum**, Meyer[4].

The type species. Approximating in size to *Pleurosternum bullocki*.

*Hab.* Europe (Germany).

*The following specimens were obtained from the Upper Keuper (Upper Trias) of Stuttgart, Würtemberg, and include the types. Most, or all, of them probably belonged to a single individual. They were all obtained with the Van Breda Collection. Purchased*, 1871.

**38650.** (*Fig.*) A bone which appears to be the imperfect first costal of the left side. Described and figured by Meyer in the 'Palæontographica,' vol. xiv. p. 121, pl. xxix. figs. 4–7. In the description it was suggested that this bone might be a prefrontal, in which case it certainly could not have belonged to the same form as the following specimens. The underlying ridge of bone seems, however, to be a rib. Deep sulci formed by epidermal shields are seen at the lateral border of the specimen, but there is no mark occupying the position usually held by the sulcus dividing the 1st and 2nd vertebral shields.

**38651.** (*Fig.*) A bone which is apparently an imperfect marginal. Described and figured by Meyer, *op. cit.* p. 122, pl. xxix. figs. 2, 3. Several sulci are shown.

[1] Neues Jahrb. 1863, p. 445.
[2] See Zool. Anzeig. vol. xi. p. 417 (1888).
[3] Jahresh. Ver. nat. Württ. vol. xlv. p. 120, pls. i., ii. (1889).
[4] *Loc. cit.*

**38652.** (*Fig.*) A dorsal vertebra, with parts of the overlying region of the carapace in an imperfect condition. Described and figured by Meyer, *op. cit.* p. 123, pl. xxix. figs. 8–10.

**38653 x.** The eighth costal bone of the left side. Traces of sulci are visible.

**38653 y.** A marginal bone, apparently from the posterior region of the carapace.

**38653.** A number of undetermined and fragmentary bones.

**28877.** The imperfect right humerus or femur of a Chelonian perhaps referable to this or an allied form; from the Upper Trias of Linksfield, near Elgin. Noticed by Owen in the 'Rep. Brit. Assoc.' for 1841, p. 168; and figured by Duff in his 'Geology of Moray,' pl. v. fig. 10 (1842). The head is wanting, and there is no distal groove or foramen. The specimen differs very markedly from the corresponding bone of any existing type. *Purchased*, 1854.

## Suborder II. *ATHECATA*[1].

Carapace composed solely of dermal ossifications, which are totally unconnected with the vertebræ and ribs. Skull typically[2] without vertical descending plates from the parietals; and the opisthotic separated from the squamosal by the quadrate.

## Family DERMOCHELYIDÆ[3].

Carapace composed either of a median row of large and broad scutes and lateral marginal rows, or of a mosaic of small irregular scutes or tesseræ, traversed by longitudinal rows of larger ones; plastron equally variable. Skull with the temporal fossæ completely roofed, the squamosal joining the parietal; tympanic ring open posteriorly; no bony floor to the narial passage; and no enlarged alveolar surface to the trenchant jaws. Humerus (fig. 51) flattened, with a large radial process placed near the middle of the shaft, a very large ectepicondylar foramen, and the head imperfectly defined and situated in the same plane as the ulnar process.

[1] Amended from Athecæ, Cope.

[2] Baur (Biol. Centralblatt, vol. ix. p. 190, 1889) states that in a skull referred to *Protostega* the parietals are connected by descending plates and epipterygoids with the pterygoids.

[3] Equal *Sphargidæ*. The relegation of the name *Sphargis* to the rank of a synonym in favour of *Dermochelys* renders the above name the proper one for the family. The retention of the name *Dermochelys*, instead of the later *Dermatochelys*, may be justified by Aristotle's δερμόπτερος. There is also a precedent in *Megatherium* in lieu of *Megalotherium*.

As cranial characters, which would be deemed of sectional importance in the Testudinata, it may be mentioned that the pterygoids are extensively separated by the basiphenoid, and that they articulate anteriorly with the vomer, which divides the palatines.

## Genus **PSEPHOPHORUS,** Meyer [1].

Syn. *Macrochelys,* Van Beneden [2] (*non* Gray).

Skull, as compared with that of *Dermochelys*, shorter, relatively larger, and much more depressed, with thicker bones, but with the same lateral maxillo-premaxillary process. A complete tessellated carapace and plastron; the former having the scutes of the larger

Fig. 51.

*Psephophorus scaldi.*—Ventral aspect of the left humerus; from the Pliocene of Belgium. About $\frac{1}{6}$. *g*, head; *h*, radial process; *i*, ulnar process; *e*, ectepicondylar foramen. (*After Dollo.*)

longitudinal rows devoid of carinæ, and more approximated than in the existing genus. Humerus (fig. 51) with the radial process relatively larger than in the latter.

### **Psephophorus,** sp.

Known only by the undermentioned specimen. It has been proposed by Dollo, 'Bull. Mus. R. Hist. Nat. Belg.' vol. v. p. 83 (1888), to

[1] Neues Jahrb. 1847, p. 579.

[2] Bull. Ac. R. Belg. sér. 2, vol. xxxi. p. 13 (1871).

dentify this form with *P. rupeliensis*, Van Beneden [1], of the Rupelian (Middle Oligocene) of Belgium, but its much lower geological horizon renders this identification very doubtful.

*Hab.* Europe (England).

**R. 1500.** Fragment of the carapace, exhibiting six tesseræ, of which two are considerably larger than the others; probably from the Middle Eocene of Bracklesham, Sussex. Noticed by A. S. Woodward in 'Proc. Geol. Assoc.' vol. x. p. 12.

*No history.*

## Genus **EOSPHARGIS**, Lydekker [2].

Skull of the general type of that of the preceding genus, but apparently still larger in proportion to the shell, and without distinct maxillo-premaxillary process. Carapace consisting (so far as can be determined) of only a single median row of broad carinated scutes, and a series of marginals on either side. Plastron only known by fragments, but doubtless devoid of tesseræ. Humerus with the radial process still longer than in the preceding genus; its length exceeding the diameter of the middle of the shaft.

From the total absence of all traces of tesseræ in the undermentioned specimens there can be little doubt that the carapace was of the simple structure above indicated.

### **Eosphargis gigas** (Owen [3]).

Syn. *Chelone gigas*, Owen [4].

The type, and only species at present known. The limb-bones indicate an animal of somewhat larger size than *Psephophorus rupeliensis*, with a relatively much larger skull.

In the memoir published by Owen on this species it is stated that the proximal extremity of the femur figured in his 'Reptilia of the London Clay' (Mon. Pal. Soc.), vol. i. pt. ii. pl. xxix. fig. 3, should be taken as the type. It seems, however, preferable to take the figured cranium in this sense, more especially since the name given in the 'Palæontology' in 1861 was applied on the evidence of the other cranium, and as the femur is not an absolutely characteristic bone.

*Hab.* Europe (England).

[1] Bull. Ac. R. Belg. sér. 3, vol. vi. p. 684 (1883).—*Sphargis.*

[2] Quart. Journ. Geol. Soc. vol. xlv. p. 241 (1889).

[3] Reptilia of the London Clay (Mon. Pal. Soc.), vol. ii. p. 1 (1880). Also in 'Palæontology,' 2nd ed. p. 317 (1861), but without description.—*Chelone.*

[4] *Loc. cit.*

**33002.** Slab of rock showing the under surface of the roof of the cranium, imperfect scapulo-precoracoid, a humerus, and what appear to be two marginal bones; from the London Clay (Lower Eocene) of the Isle of Sheppey. The skull is noticed by Owen in his 'Palæontology,' 2nd ed. p. 317, and also in his 'Reptilia of the London Clay,' vol. ii. p. 3 (1880). The under surface of the cranium exhibits the contour of the orbits and nares, the sharp alveolar borders, and the channel underlying the parietals, without giving off descending pterygoidal plates; the extreme breadth is 0,330 (13 inches). The scapulo-precoracoid is very imperfect. The humerus has lost the greater portion of the bone itself, but the contour is almost entirely preserved. The contour agrees extremely closely with that of the imperfect type humerus of *Psephophorus rupeliensis* figured by Dollo in the 'Bull. Mus. R. Hist. Nat. Belg.' vol. v. pl. iv. fig. 7; but the shaft is more constricted and the radial process more elongated. The humerus of the present specimen indicates, however, a somewhat larger individual, its total length being about 0,366 (14·5 inches). The bones regarded as marginals overlie the parietal region of the cranium in the slab. *Purchased*, 1858.

**R. 31.** (*Fig.*) The nearly entire cranium; from Sheppey. Figured by Owen in his 'Reptilia of the London Clay,' vol. ii. pls. i. & ii., and also in his 'History of British Fossil Reptiles,' vol. iv. pls. xxx. and xxxi. Although somewhat obscure, the contour of the bones of the palate and the forward position of the posterior nares can be traced, while the sharp alveolar border of the jaws is very distinct. The whole arrangement of the palate is essentially that of *Dermochelys*. *Purchased*, 1880.

**44089.** A slab in two portions containing a number of bones of the skeleton; from Sheppey. This specimen is noticed by Owen in his 'Reptilia of the London Clay,' vol. ii. p. 3, where it is incorrectly stated to belong to the same individual as the preceding. The most important bones are an imperfect scapulo-precoracoid, the two coracoids in their original position, a detached anterior rib, and two ribs overlain by the median row of dermal scutes, together with a large bone which is probably an epiplastral. The coracoids are relatively wider and flatter than in *Dermo-*

*chelys*; the bone lying between them and described by Owen as the entoplastral is more probably an anterior rib. The dorsal scutes are transversely elongate, and measure about 0,110 (4 inches) in length by 0,220 (8 inches) in breadth; they were described by Owen as neural bones, but there are three of them overlying two ribs, besides which those at one extremity of the slab have no underlying rib or vertebra, while at the other extremity a distinct separation can be seen between them and the ribs. Seven of these scutes are preserved. The large imperfect bone underlying one of the coracoids is provisionally regarded as an epiplastral. *Purchased*, 1873.

**41899.** Fragment showing on one side four scutes of the dorsal row of the carapace, of which the first and last are imperfect, and on the under surface one entire and one imperfect dorsal vertebra, the heads of two ribs, nearly in their original position, together with some undetermined bones; from Sheppey. *Purchased*, 1870.

**44089.** Fragment showing the greater portion of two dorsal scutes, together with a transverse section of a vertebra; from Sheppey. *Purchased*, 1873.

**39220.** Fragments of three nearly entire dorsal scutes of a smaller individual; from Sheppey. This specimen formed part of a septarian nodule, and is consequently much traversed by cracks. *Bowerbank Collection. Purchased*, 1865.

**44090.** The imperfect distal extremity of the right humerus, associated with the preceding specimen. The general contour is very similar to that of the left humerus of *P. scaldi*, figured by Dollo, *op. cit.* pl. iv. fig. 1, but the distal expansion is more marked. *Purchased*, 1873.

**R. 1501.** The middle of the shaft of the right humerus of a very large individual; from Sheppey. *No history.*

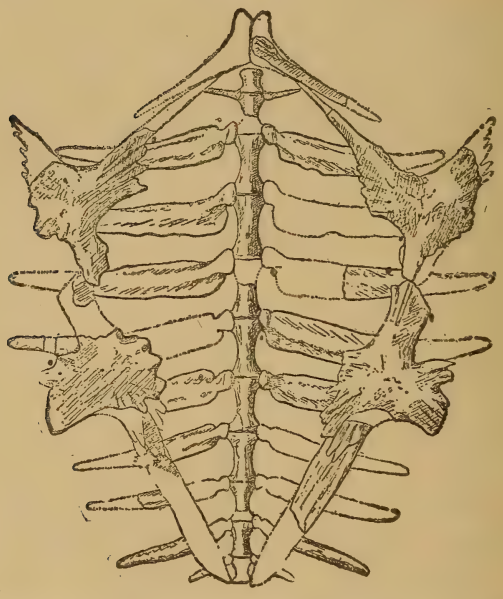
**39446.** The imperfect shaft of the right humerus of an equally large individual; from Sheppey. *Bowerbank Collection.*

## Family PROTOSTEGIDÆ.

Carapace apparently represented merely by a row of marginals, but the plastron very strongly developed and composed of thick ossifications. Humerus (when known) with the radial process short, blunt, and approximated to the head. Skull at present undescribed, but, according to Baur [1], approximating to that of the *Chelonidæ*.

The procœlous vertebræ of the type genus, which were provisionally regarded by Cope as dorsals and are described as showing indications of transverse processes, are more probably referable to the cervical region. The above interpretation of the structure of the shell is

Fig. 52.



*Protosphargis veronensis*.—Ventral aspect of the thoracico-abdominal region; from the Upper Cretaceous of Italy. $\frac{1}{15}$. (*After Capellini.*)

based on the observations of Baur [2], who regards the bones provisionally referred by Cope to the carapace as plastral. In the form from the Upper Cretaceous of Italy described by Capellini [3] as *Protosphargis* (fig. 52), the humerus is unknown, and the ribs have not the scaly expansions found in the type of *Protostega*. It has

[1] See note on p. 223. [2] Zool. Anzeig. vol. ix. pp. 687–689 (1886).
[3] Atti R. Ac. Linc. ser. 3, vol. xviii. p. 291 (1884).

been stated that marginals are wanting in *Protosphargis*, but according to Baur [1] they were present. If this be so, further observations are required to prove the right of the European form to generic distinction.

### Genus **PROTOSTEGA**, Cope [2].

The type genus. Postaxial border of humerus more or less deeply emarginate, and the lateral process closely approximated to the head.

The humeri figured by Leidy, 'Cretaceous Reptilia of the United States' (Smiths. Contrib. Knowl. vol. xiv. 1865), pl. viii. figs. 1–8, as Mosasaurian, and subsequently referred by Cope (Proc. Amer. Phil. Soc. vol. xii. p. 333, 1872) to *Protostega* as *P. neptunia* and *P. tuberosa*, appear to be certainly generically distinct from *P. gigas*, and are much more like the bones of *Chelonidæ*, one of the specimens being very similar to the humerus referred to *Lytoloma cantabrigiense* (p. 69). These specimens were subsequently referred by Leidy ('Rep. U.S. Geol. Surv. Terrs.' vol. ii. pt. i. p. 342) to *Atlantochelys*, Agassiz [3], under the names of *A. mortoni* and *A. neptunia*, the former specimen being apparently the type of that genus. The term *Atlantochelys*, as stated by Cope (Proc. Amer. Phil. Soc. vol. xii. p. 433), was, however, unaccompanied by a sufficient description to justify its adoption; and it would appear, moreover, from the foregoing observations that it is not really identical with *Protostega*, for which Leidy and, at one time, Baur have proposed to employ it.

The following specimens are provisionally referred to the present genus, since the humerus of *Protosphargis* is at present unknown; but it is quite possible that they may belong to the latter genus, if that be really distinct.

#### **Protostega anglica**, Lydekker, n. sp.

Very imperfectly known, but specifically distinguished from the typical *P. gigas*, Cope [4], of the Cretaceous of North America, by the less deeply emarginate postaxial border of the humerus.

*Hab.* Europe (England).

**49926.** Fragment of chalk exhibiting the ventral aspect of a small imperfect right humerus; from the Chalk of Lewes, Sussex. The proximal portion, which is nearly entire,

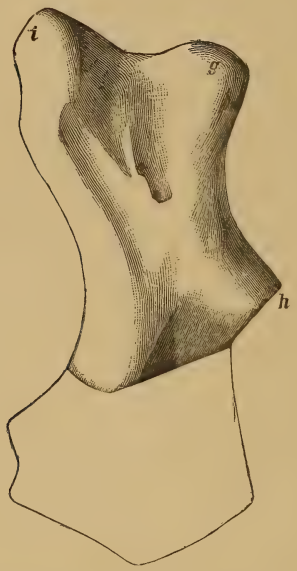
[1] Biol. Centralblatt, vol. ix. p. 184 (1889).
[2] Proc. Amer. Phil. Soc. vol. xii. p. 175 (1872).
[3] Proc. Ac. Nat. Sci. Philad. vol. iv. p. 169 (1849).
[4] *Loc. cit.*

resembles the corresponding part of the larger humerus of *P. gigas*, figured by Cope in the 'Rep. U.S. Geol. Surv. Terrs.' vol. ii. pl. xii. fig. 2. The moderately deep emargination of the postaxial border and the approximation of the radial process to the head are clearly shown.

*Capron Collection. Purchased*, 1879.

**49926 a.** The imperfect proximal portion of a nearly similar right humerus; from the Chalk of Dorking, Sussex. The head and mesial process are wanting. *Capron Coll.*

Fig. 53.




*Protostega anglica.*—Ventral aspect of the imperfect left humerus; from the Cambridge Greensand. $\frac{1}{3}$. Letters as in fig. 51.

**35316.** The imperfect proximal portion of a similar right humerus; from the Cambridge Greensand. The head is entire, and the sharp edge of the inferior border of the radial process is shown. *Purchased*, 1859.

**35365.** (*Fig.*) The proximal half of a considerably larger left humerus of the same type as the preceding; from the Cambridge Greensand. This specimen (fig. 53), which has been somewhat waterworn, although most of the characteristic features are shown, is the type, and is noticed by the writer in the 'Quart. Journ. Geol. Soc.' vol. xlv. p. 236. *Purchased*, 1859.

ORDINAL POSITION UNCERTAIN.

## Genus **PSEPHODERMA,** Meyer[1].

Carapace consisting of a great number of polygonal scutes, which are much more regular than those of *Psephophorus*, and having several longitudinal rows of carinated scutes of somewhat larger size than the others. Peripheral scutes angulated.

There has been much discussion as to the systematic position of this form; it was at one time regarded by Baur[2] as undoubtedly Chelonian, in which case it will clearly belong to the present sub-order; but the same writer[3] has subsequently suggested that the specimens on which it is founded may belong to *Nothosaurus*.

### **Psephoderma alpinum,** Meyer[4].

The type species.

*Hab.* Europe (Germany).

**37995.** Cast of a slab showing the dorsal aspect of the imperfect carapace. The original was obtained from the topmost Rhætic—the Dachsteinkalk which immediately overlies the Körsener-Schichten—of Ruhpalding, Bavaria, and is preserved in the Museum of the Royal Mining Administration at Munich. It is the type specimen, and is figured by Meyer in the 'Palæontographica,' vol. vi. pl. xxxix.
*Purchased*, 1864.

**38703.** Two scutes approximating in contour to the peripheral scute of *P. anglicum*, and probably belonging either to the present or an allied form; from the Lettenkohle (Lower Keuper) of Hohenecke. *Purchased*, 1869.

**38703 a.** Two similar scutes from the same locality in matrix.
*Purchased*, 1869.

### **Psephoderma anglicum,** Meyer[5].

Known only by detached scutes, and perhaps not specifically distinct from the type.

*Hab.* Europe (England).

**R. 1512.** Cast of an angulated peripheral scute. The original, which is one of the types, was obtained from the Rhætic of Bristol, and is preserved in the Museum at Bath. It

[1] Palæontographica, vol. vi. art. 6, p. 246 (1858).
[2] Zool. Anzeig. vol. ix. p. 688 (1886).
[3] Biol. Centralblatt, vol. ix. p. 190 (1889).
[4] *Loc. cit.*
[5] Palæontographica, vol. xv. art. 5, p. 261 (1867).

is figured by Meyer in the 'Palæontographica,' vol. xv. pl. xl. fig. 1. *Made in the Museum*, 1889.

**R. 1513.** Cast of a flat scute. Original from same locality as the preceding, and figured by Meyer, *op. cit.* fig. 6, as one of the types. *Made in the Museum*, 1889.

**R. 1514.** Cast of a smaller scute. The original was likewise obtained from the Bristol Rhætic, and is preserved in the Bath Museum. *Made in the Museum*, 1889.

GENUS *non det.*

**25747.** (*Fig.*) A bone which has been regarded as the right dentary of a Chelonian; from the Chalk of Sussex. Figured in Dixon's 'Geology of Sussex,' 1st ed. pl. xxxiii. figs. 3, 4, as *Orthagoriscus.* Noticed by Smith Woodward in the 'Proc. Geol. Assoc.' vol. x. p. 276, where it is definitely regarded as Chelonian. If this reference prove to be correct, the specimen will indicate a form widely different from any recent Chelonian. *Dixon Collection. Purchased*, 1851.

# ADDENDA.

Incertæ sedis.

## Genus **STEGOCHELYS,** Lydekker[1].

A provisional genus, characterized by the complete roofing of the temporal fossa, in which the postfrontal forms a long junction with the parietal, and by the deep notch in the lateral wall of the cranium immediately behind the maxilla. The type skull, which now appears to be lost, is represented with distinct nasals, but it is doubtful if this is really the case.

If the second of the undermentioned specimens really belong to this genus, the latter would appear to be referable to the *Acichelyidæ*, and may be identical with one of the Kimeridgian genera.

### **Stegochelys planiceps** (Owen[2]).

Syn. *Chelone planiceps*, Owen[3].

The type species. Of large size, the length of the cranium being 0,090 (3·55 inches).

*Hab.* Europe (England).

**R. 1672.** Fragment of rock exhibiting the ventral aspect of the imperfect mandible; from the Portland Oolite of the Isle of Portland. This specimen, of which the symphysis is entire, precisely resembles the mandible of the type skull from the same deposits, figured by Owen in his 'History of British Fossil Reptiles,' Chelonians, pl. viii. figs. 1–3.

*Presented by G. Clifton, Esq.*, 1889.

[1] art. Journ. Geol. Soc. vol. xlv. p. 229 (1889).

[2] Rep. Brit. Assoc. for 1841, p. 168 (1842).—*Chelone.*

[3] *Loc. cit.*

**R. 1673.** Slab of rock exhibiting the ventral aspect of the imperfect hinder portion of the right side of the plastron, together with portions of two costal bones, the head of a femur, and the centrum of a caudal vertebra, of a large Chelonian probably referable to this form; from the Portland Oolite of the Isle of Portland. The plastron exhibits portions of the hyo-, hypo-, and xiphiplastrals, with the sulci of the overlying shields; and there is a large mesial vacuity. There appears to have been no mesoplastral, and in the shortness and width of the hypoplastral the specimen agrees very closely with the *Acichelyidæ*[1], and differs from the *Plesiochelyidæ*. Allowing for the effects of crush, the femur appears to agree closely in size with that of *Thalassemys*, No. R. 1645 (p. 148).

*Presented by G. Clifton, Esq.*, 1889.

### Generically Undetermined Specimens.

#### a. *From the London Clay.*

**49981.** The imperfect proximal extremity of the left humerus of a Chelonian of the approximate size of a small individual of *Podocnemis expansa*; from the London Clay of the Isle of Sheppey. This specimen closely resembles the humerus of existing Pleurodirans, and probably belongs to that section. *Wetherell Collection. Purchased*, 1871.

#### b. *From the Chalk.*

**49924.** Fragment of chalk, showing the dorsal aspect of a left coracoid; from the Lower Chalk of Glynde, near Lewes, Sussex. In its extremely expanded form this specimen resembles the coracoid of *Chelys*, and is unlike that of most of the *Chelonidæ*[2]. It is nearly of the same size as the coracoid of *Chelys*, and would agree approximately in relative size with the mandible (No. 49220) mentioned on p. 181, with which it may perhaps have been associated. *Capron Collection. Purchased*, 1879.

[1] Compare Rütimeyer, N. Denkschr. schw. Ges. Nat. vol. xxv. art. 2, pl. xvii. fig. 1.

[2] *Lytoloma crassicostatum* comes nearest in this respect.

c. *From the Cambridge Greensand.*

**35300 x.** The centrum of a cervical vertebra. This specimen is probably referable to the *Chelonidæ*. *Purchased*, 1859.

**35300 z.** The centrum of a much smaller cervical (?) vertebra. In size this specimen would agree with some of the skulls of *Rhinochelys*, and there are indications of the presence of transverse processes like those of the Pleurodira. *Purchased*, 1859.

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